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THE
AMERICAN CYCLOPÆDIA.

VOL. VIII.
GLASGOW—HORTENSE.

De Gray

THE
AMERICAN CYCLOPÆDIA:
A
Popular Dictionary
OF
GENERAL KNOWLEDGE.

EDITED BY
GEORGE RIPLEY AND CHARLES A. DANA.

SECOND EDITION, REVISED.

VOLUME VIII.
GLASGOW—HORTENSE.

NEW YORK:
D. APPLETON AND COMPANY,
549 AND 551 BROADWAY.
LONDON: 16 LITTLE BRITAIN.
1879.

ENTERED, according to Act of Congress, in the year 1859, by D. APPLETON AND COMPANY, in the
Clerk's Office of the District Court of the United States for the Southern District of New York.

ENTERED, according to Act of Congress, in the year 1874, by D. APPLETON AND COMPANY, in
the Office of the Librarian of Congress, at Washington.

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THE AMERICAN CYCLOPÆDIA.

GLASGOW


GLASGOW, the chief commercial and manufacturing city of Scotland, in Lanarkshire, on the river Clyde, 21 m. from its mouth, and 41 m. W. S. W. of Edinburgh; lat. $55^{\circ} 51' 32''$ N., lon. $4^{\circ} 17' 54''$ W.; pop. in 1660, 12,000; in 1765, 23,046; in 1801, 83,769; in 1851, 347,001; in 1861, 395,503; in 1871, of the parliamentary burgh, 477,144, of the whole town, 547,538. The city is about 3 m. long, and lies on both sides

of the river, here about 500 ft. wide, which is crossed by two suspension and three stone bridges, below which are several ferries. The site is mostly level, but in the N. and N. W. parts are considerable elevations. The original burgh, which took its rise from the cathedral and the university, is on the N. bank; but the various suburbs are now so closely connected that they can hardly be considered otherwise than



Albert Bridge, Glasgow.

as portions of one compact city. The principal streets are parallel with the river, two of the broadest bordering it on either side. There are three public parks: the Green, of 140 acres, on the N. bank of the Clyde, near the E. end of the city; Kelvingrove, of 40 acres, at the W. end; and Queen's park, of 100 acres, on elevated ground at the south. These parks are

all handsomely laid out and ornamented. The streets mostly cross  right angles, are well paved, lighted, and drained, and are adorned with several fine statues. Many of the houses are of white freestone, constructed in flats. There are two theatres, two museums, two public libraries (of 30,000 and 15,000 volumes), asylums for the blind, insane, aged, and deaf

and dumb, a university, and 175 churches and chapels. The last named are divided as follows: Free church, 43; Established church, 40; United Presbyterian, 37; Roman Catholic, 12; Independent, 9; Baptist, 7; Episcopal, 5; Reformed Presbyterian, 4; other denominations, 18. A bishopric was erected in Glasgow about 1115; in 1488 it was made an archbishopric. At present it is the seat of a bishop of the Scotch Episcopal church and of a Roman Catholic vicar apostolic. Five daily and 15 weekly newspapers are published. There is a botanic garden of 40 acres in the N. W. part of the city, which is open to the public in summer. The cathedral, said to be the finest Gothic building in Scotland, overlooks the city from the northeast. It was built by David I. about 1133, but was burned in 1192; the present edifice was immediately begun, and was consecrated in 1197, but was not finished until the present century. Its most celebrated features are the crypt and the profusion of brilliant stained glass. The university was chartered in 1443 by James II., but it had only a feeble existence until 1560, when Queen Mary bestowed upon it half of the confiscated church property in the city; this endowment has been greatly increased by additional grants from the corporation and the crown. It has a library of 105,000 volumes, founded in 1473, an observatory, and numerous cabinets and collections. The grounds include 22 acres, and the new buildings, finished in 1870, cost £370,000. The number of matriculated students averages 1,200. The university confers degrees in arts, law, medicine, and divinity. The principal public buildings are the royal exchange, the town hall, and Hutcheson's hospital. The city is supplied with water from Loch Katrine, by an aqueduct 26 m. long.—Glasgow was erected into a burgh about 1190, with the privilege of an annual fair. In 1556 it ranked eleventh among the towns of Scotland. It is now the fourth exporting city of Great Britain, and the second in wealth and population. Its immense growth, mainly within the present century, is due to its situation in the midst of a rich coal and iron district, and its seaport facilities. Large sums have been spent in clearing and deepening the channel of the Clyde, including the removal of several islands, and it is now navigable for vessels of 2,000 tons. The quays are 16,680 ft. in extent. In the 18th century Glasgow was the centre of the tobacco trade of Great Britain, and its merchants also dealt largely in the sugar and other products of the West Indies. Later it entered extensively into brewing, dyeing, and calico printing, and finally into ship building (especially of iron ships), iron casting, and machine making, and the preparation of chemicals. The St. Rollox chemical works, the largest in the world, N. of the cathedral, cover 16 acres, employ more than 1,000 men, and have a chimney 450 ft. high. A still taller chimney (460 ft.) is that of the artificial manure works. In 1871 the number

of spindles was 2,000,000, consuming annually 125,000 bales of cotton, and supplying 27,000 power looms. There are large glass works and paper mills, and the turkey-red dyes produced here are famous. The value of exports in 1871 was £10,049,987, of which £2,223,221 were to the United States; the value of imports was £6,577,575, of which £2,894,273 were from the United States. Glasgow is governed by a lord provost, 8 bailies, and 39 councillors, with the dean of guild from the merchants' and the deacon convener from the trades' house, and returns three members to the house of commons.—The Romans had a station on the Clyde in the locality of the city, and Antoninus's wall commenced a few miles W. of it. Tradition assigns the foundation of Glasgow to St. Kentigern, whom it makes its first bishop, about 560. In 1300 a battle between the Scots under Wallace and the English under Percy was fought in the High street, when Percy was defeated and slain. In 1350, '80, and '81, Glasgow was visited by the plague. About 1542 the regent Arran besieged the earl of Lennox in the bishop's castle, obtained it on promise of terms, and put the garrison to the sword. The same leaders subsequently fought a battle at the Butts in the E. part of the city, when the regent gained the victory and plundered it. In 1560 reformed superintendents superseded Catholic bishops. In 1638 the famous assembly of the Presbyterian church was held here, when episcopacy was abjured. For several years thereafter the city was a prey to both parties in the civil wars. Fire, plague, plunder, and famine desolated the place. On June 4, 1690, a charter of William and Mary conferred on the townsmen the right of electing their own magistrates. Glasgow was strongly dissatisfied with the union of Scotland and England, but in 1715 and again in 1745 sided with the house of Hanover and raised a force against the Stuarts, for which the pretender's army on the retreat from Derby levied contributions. On the breaking out of the American revolutionary war, Glasgow raised a regiment of 1,000 men, and fitted out 14 privateers. In 1820 the public peace was disturbed by radical political riots, and in 1848 by the chartists.

GLASS (*Sax. glass*), in chemistry, any product of fusion having the peculiar lustre known as vitreous, hard and brittle, whether transparent or not; in common use, the transparent product derived from the fusion of silica with an alkali to which lime or a metallic oxide is added. No material invented by man is to be compared with glass in the service it has rendered. To its aid, applied in a thousand different forms, the sciences, particularly chemistry and astronomy, are essentially indebted for their advancement; and its uses in common life render it no less important to the daily wants of mankind. The purity of its material causes the presence of foreign substances to be instantly detected, and it is consequently the most cleanly substance, and especially suited

for vessels for holding and keeping liquids. It resists the action of nearly all the powerful chemical reagents; and but for this substance many of them would never have been known, nor could they now be made and kept.—Nothing definite is known concerning the discovery of the art of glass making or the early history of its manufacture. The statement made by Pliny that some Phœnician mariners having landed on the banks of a small river in Palestine, “and finding no stones to rest their pots on, they placed under them some masses of *nitrum* [soda, as is supposed], which, being fused by the heat with the sand of the river, produced a liquid and transparent ‘stream,’” is not generally accepted as showing the origin of glass. A stronger heat than could be obtained from an open fire would be required to effect this result. Nor is much more credit to be attached to his accounts respecting the production of a glass of malleable character, which when thrown upon the ground was merely indented, and could be restored to shape with a hammer, as if it were brass. Some metallic salts, as chloride of silver, possess ductility at the same time with a glossy appearance, and of one of them the articles referred to may perhaps have been made; but all modern experience is opposed to the possibility of a vitrified body being malleable. It has been established with certainty that the art was practised among the Egyptians at a very early period. Paintings on a tomb at Beni Hassan, supposed to date from the reign of Osortasen I., about 3,000 B. C., represent Theban glass blowers at work with blowpipes very similar to those used at the present day. A necklace bead of material similar to the modern crown glass was found at Thebes, bearing the name of the queen of Thothmes III., who reigned about 1500 B. C., inscribed in hieroglyphics. In the British museum there is an interesting ancient Egyptian specimen in the form of a small bottle of opaque light-blue glass, on which

but also for mosaic work, the figures of deities and sacred emblems, and even for coffins, in all of which they attained excellent workmanship and surprising brilliancy of color. The glass works of Alexandria, in operation in the time of Strabo and Pliny, were famous among



FIG. 2.—Blue Glass Bottle with Name of Thothmes III.



FIG. 3.—Green Glass Vase with Name of Sargon.

the ancients. According to Theophrastus, the processes of cutting or grinding, of gilding and coloring, were in use 370 years B. C. Articles of exquisite workmanship were produced, but of great cost, and known only as luxuries. Vases and cups, some enamelled and beautifully cut and wrought with raised figures, and some remarkable for the brilliancy of their colors, were furnished to the Romans. From the Egyptians the Phœnicians are supposed to have received the art, which flourished at a very early period at Sidon and Tyre. In the ruins of Nineveh glass lenses, vases, bottles, &c., have been found; but there is no indication of the use of glass for windows. A small vase of transparent green glass, on which are engraved in outline a lion and the name and titles of the Assyrian monarch Sargon, 719 B. C., is preserved in the British museum, and is regarded as the earliest dated specimen of transparent glass. It was found in the palace of Nimrud in Nineveh. That the manufacture of glass was extensively practised by the ancient Greeks, and that they had acquired great skill in the art, are shown by the remarkable collection of specimens taken by Cesnola from the tombs at Dali on the island of Cyprus in 1866-'70, and deposited in the metropolitan museum of art, New York, in 1872. This collection of Greek glass, the most extensive known, comprises 1,700 articles, not only plain and simple, but various in form and color, and iridescent and incrustated. There are plates plain, fluted, and with handles, in the various colors and in different shades of the same color. There is a great variety of ornamental cups and vases, and bottles of all sizes and shapes known to any people. (See CESNOLA.) The manufacture of glass was introduced into Rome in the time of Cicero. During the reign of Nero great improvements were made and

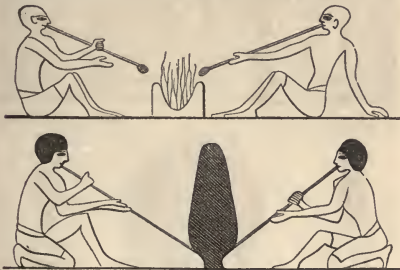


FIG. 1.—Theban Glass Blowers.

are painted in yellow the names and titles of the same monarch. Ornaments imitating precious gems in color and beauty show that the art had been brought to a high degree of perfection by the Egyptians. Not only was glass used by them in making drinking vessels,

great skill was attained in the production of ornamental articles. At this early period only articles of luxury were produced, chiefly vases and cups for the tables of the wealthy, or urns



FIG. 4.—Cesnola Collection of Cypriote Glass in the Metropolitan Museum of Art, New York.

and lachrymatories for their tombs. In the 3d century articles of glass were in common use. Numerous specimens of Roman glass have been found in the ruins of Herculaneum and Pompeii. From these it appears that glass was used for admitting light to dwellings in Pompeii, although other houses had window frames filled with a kind of transparent talc. The great perfection which the art had attained among the Romans is attested by the celebrated Barberini or Portland vase in the British museum, said to be the most beautiful example known of glass of two layers. This vase was found about the middle of the 16th century in a marble sarcophagus near Rome, and is supposed to have been made as early as 138 B. C. After having been for more than two centuries the principal ornament in the Barberini palace in Rome, it was purchased by the duke of Portland for £1,029, and placed in the British museum. Here it was broken by a madman into many pieces, which were afterward joined together

with great skill. The vase is about 10 inches high, and is composed of two layers of glass, the under one being of a deep blue color and the other of opaque white. The raised figures appear in white upon a beautiful background of blue, and by some are supposed to represent the marriage of Peleus and Thetis.—In the 13th century, and for several centuries after, the Venetian was the best and the most famous glass in commerce. The principal works were at Murano, one of the islands adjacent to Venice. Here the manufacture was long successfully prosecuted, being sustained by the fostering care of the government, and its workmen being invested with extraordinary privileges. Glass mirrors were probably first made here, and they became famous all over Europe, gradually taking the place of the mirrors of polished metal which were before in use. Many of the ornamental objects they produced were exceedingly ingenious, and are reproduced and admired even at this day. The Bohemians next acquired reputation in this art; and owing to the purity of the materials found in abundance in their country, as well as



FIG. 5.—1. The Portland Vase. 2. Opposite figures enlarged. 3. Device on bottom. 4, 4. Devices on handles.

to their skill, their wares still continue famous. The superiority of the Bohemians was evinced especially in the production of white glass, made with pure quartz and lime and the pot-

ash obtained by burning the trees of their immense forests. This glass was for a long time held in the highest estimation, but was destined to lose its fame when flint glass with lead was produced in England. The engraved glass of Bohemia became especially celebrated. The French, perceiving the importance of the business, early imitated the example of the Venetians, and gave extraordinary encouragement to any of the nobility who would prosecute the manufacture. In 1634 attempts were made to produce mirrors from blown glass, as was practised so successfully by the Venetians; but about the year 1666 it was found necessary to procure workmen from Venice. Works were then erected at Tourlaville near Cherbourg, which was selected from the resemblance of the locality to that of the works at Murano. In 1688 Abraham Thévert introduced in Paris the method of making large plates by casting the glass instead of blowing; he thus produced heavy plates measuring 84 inches by 50, while those previously made had barely reached in length the smaller figure named, and were necessarily thin. In 1665 the manufacture of glass was established at St. Gobain. In the

first positive allusions to the use of glass for windows were made by Lactantius about the close of the 3d century, and by St. Jerome about the close of the 4th. It is asserted by the



FIG. 6.—Venetian Glass Bottle.

18th century the business became very successful, and has continued so to the present time, the products of the establishment ranking among the first in quality in the world.—The



FIG. 7.—Engraved Bohemian Drinking Glass.

Venerable Bede that glass windows were first introduced in England in 674 by the abbot Benedict; but at this time and for many centuries afterward the use of window glass was limited to ecclesiastical structures. Colored window glass is known to have been used in churches in the 8th century; but for private houses glass long continued to be a rarity, and in England in the 12th century houses provided with glass windows were regarded as magnificent. Even in the 16th century in England and the 17th in Scotland only the dwellings of the wealthy were provided with glass. The manufacture of window glass, according to an old builder's contract brought to light by Horace Walpole, and copied into his "Anecdotes of Painting," was conducted in England as early as 1439; but a decided preference was given to that "from beyond the seas." It

was commenced in London in 1557; and soon afterward flint glass also was made there. The production of plate glass was undertaken in 1670 at Lambeth by the duke of Buckingham, who imported Venetian workmen. The government encouraged the enterprise by a bounty upon the glass intended for exportation; and under this protection, also extended to the different branches of the manufacture, by which the cost was reduced from 25 to 50 per cent., many other glass factories sprung up in different parts of the kingdom; but their prosperity and the progress of the art were afterward greatly checked by the excise duties imposed, and the surveillance of crown officers over all the operations of the works. The bounties and the duties, with their annoying restrictions, were abolished in 1845, when the suddenly increased demand for home consumption brought into existence many more establishments. Their capacity for production became immense, as is shown by the fact that the firm of Chance and co. executed the large order in sheet glass for the crystal palace in 1851 without materially affecting their ability to fill their general orders. The quality of the English crown glass is unrivalled.—Glass appears to have been one of the earliest branches of manufacture introduced into the United States; but to what extent it was carried on in early times is unknown. In Salmon's "Modern History" (London, 1746), vol. iii., p. 440, mention is made of glass works which were commenced at Jamestown, Va., and the completion of which was interrupted by the Indian massacre of March 22, 1622; and in Howe's "Historical Collections of Virginia," p. 39, is a quotation from "Smith, book iv., p. 18," in which, under date of 1615, it is said that "for a long time the labor of the colony had been misdirected in the manufacture of ashes, soap, glass, and tar, in which they could by no means compete with Sweden and Russia." In Felt's "Annals of Salem," Mass., reference is made to the "Glass-house Field," so named from the fact that in 1639 and 1640 several acres of land were appropriated to Ananias Conklin and others for the purpose of aiding them in the manufacture of glass, which was carried on for a considerable period. About 1750 works were established by Germans at Germantown, Mass. (now a part of Quincy), for the manufacture of bottles, but they were burnt before the revolution. But the first glass factory in the United States of which we have a precise account was built by Mr. Robert Hewes of Boston, in the town of Temple, N. H., in 1780. It appears that the works were established there on account of the cheapness of fuel and labor. In the winter of 1780-'81 they were destroyed by fire. From a reference to this subject by Washington in his diary (1789) it would appear that glass was made at that time in New Haven. It is believed that in Salem and in Hewes's works only bottles and ordinary ware were made, and that the first window glass was

manufactured in Boston. In 1787 a company was incorporated for the manufacture of crown glass, and after numerous embarrassments the first glass was made in 1793, under the superintendence of a German named Lindt. The shares of the company attained a high value, and the Boston crown glass became celebrated for its excellence. The subsequent failure of the company was owing to the mismanagement of a board of directors who attempted to substitute American for German clay, and made other expensive and unsuccessful experiments; among these was the expansion of their business by the erection of other works for making thin crown glass at South Boston and sheet glass at Chelmsford. Works were established by the New England crown glass company for the manufacture of that article in East Cambridge about 1825, and others for bottles and for flint glass about the same period. Other crown glass works were erected in New York and other states at subsequent periods, but all were discontinued many years ago. The New England glass company, established in 1817 at East Cambridge for the manufacture of flint glass, is still in existence, and has gained a wide reputation for the excellence of its wares. Besides these works, the chief establishments for the manufacture of flint glass in the United States are in Sandwich, Mass., Brooklyn, N. Y., and Pittsburgh, Pa., and its vicinity. Sheet glass is made in Lanesborough, Mass., New Jersey, New York, Pennsylvania, and in a few places in the western states. The first plate glass manufactory was established at Cheshire, Berkshire co., Mass., about 1853. The company afterward removed their works to Lenox in the same county, and became known as the "Lenox Rough Plate Glass Company." They have the machinery for making polished plate glass, but have not yet produced it in large quantities. Henry R. Schoolcraft was employed in his youth in the works at Cheshire, and in 1817 he published a treatise entitled "Vitreology," designed to exhibit the application of chemistry to this art.—Glass is a chemical compound of variable ingredients, different substances of similar character replacing each other to produce its varieties. Silicic acid or silica is its principal element, which combines with the potash, soda, oxide of lead, lime, alumina, and other substances that may be added, to produce silicates of these bases. By the manufacturer the bases are classed as fluxes. Boracic acid may take the place of silicic acid to produce vitreous borates or glass. The proportions of the bases named admitting in their use of indefinite variations, a wide scope is given for the exercise of the skill of the manufacturer in producing any particular quality of glass. The metallic oxides also afford him abundant resources for imparting any desired hue to his product, according as these are judiciously selected and introduced. The important requisite in all the varieties of glass is a fusible

compound, which solidifies on cooling into a transparent mass, without assuming a crystalline structure. Such a substance is a product of the process of reducing metallic ores. The compounds produced by the glass manufacturer range from the most fusible combinations of one part of silica with two or three of soda or potash, which melt at a cherry-red heat and dissolve in cold water, to the hard and refractory silicates of lime and alumina, some of which require the powerful heat of a furnace to soften them. Potash especially increases the fusibility of glass; the oxides of lead and of zinc, and to some extent barytes, produce a similar effect, while they also add to its softness, its lustre, its specific gravity, and its power of refracting light, and do not interfere with its perfect freedom from color, unless the lead be used in excess, when it gives a yellowish tinge. Iron, in the state of the silicate of the protoxide, imparts a dark green color; but on adding a small quantity of binoxide of manganese (MnO_2) the color disappears, as the protoxide of iron is converted into the sesquioxide (Fe_2O_3), and the manganese, losing one atom of oxygen, becomes MnO . Other metallic oxides, as those of uranium, copper, silver, and gold, are also employed to give intense colors. Without reference, however, to substances used for imparting or removing colors, the essential materials of ordinary glass may be regarded as silica and boracic acid, the

alkalies, lime, and oxide of lead. The varieties of glass are classified by Dr. Knapp as follows: 1. Bottle glass, including the varieties worked into hollow vessels and tubes, as common bottles, glass for medicinal bottles, white bottle glass for vials, tumblers, tubes, &c. The dark-colored varieties are distinguished for their large proportion of oxide of iron and alumina, and none contain oxide of lead. The white bottle glass contains silica, soda or potash, and lime. 2. Window glass, including English crown and cylinder or sheet glass; this is a silicate of potash or soda, lime, and alumina. 3. Plate glass, differing from the preceding only by the greater purity and freedom from color of the materials. 4. Flint glass, used for grinding, &c., composed of silica, potash, and oxide of lead. 5. Crystal, for optical purposes and table ware, consisting of silica or boracic acid, potash, and more lead than the preceding. 6. Strass, the paste used for imitations of precious stones; it contains much oxide of lead, and also metallic oxides used for the colors. 7. Enamel, composed of silica, soda, and oxide of lead, but rendered opaque by oxide of tin or antimony, which form a stannate or antimoniate with the soda. To these may be added the soluble glass, which is a simple silicate of soda or of potash, or a mixture of the two silicates. The following analyses of several kinds of glass are from Knapp's "Chemical Technology: "

VARIETIES OF GLASS.	No.	Analyst.	Silica.	Potash.	Soda.	Lime.	Magnesia.	MnO.	Alumina.	Oxide of iron.	Oxide of lead.	Proportions.*
Bottle glass, French	1	Berthler...	60.00	8.10	.....	22.30	..	1.2	8.00	4.00	....	5:2
" "	2	"	59.60	8.20	.....	18.00	7.0	0.4	6.80	4.40	....	7:3
" "	3	Dumas	58.55	5.48	.....	29.22	..	..	6.01	5.75	....	2:1
" "	4	"	45.60	6.10	.....	28.10	..	..	14.00	6.20	....	4:3
Medicinal glass, French	1	Berthler	69.60	8.00	8.00	18.00	0.6	..	8.60	.....	1.60	9:2
" "	2	"	62.00	.....	16.40	15.60	2.2	..	2.40	.....	0.70	5:1
Window glass, French	1	Dumas	69.25	.....	11.80	17.25	..	..	2.20	.....	.....	4:1
" "	2	"	68.50	.....	18.70	7.80	..	..	10.00	.....	.....	7:2
" English	3	Richardson	66.87	.....	14.23	11.86	..	..	8.16	.....	.....	7:2
" "	4	Cowper	71.40	.....	15.00	12.40	..	0.3	0.60	0.80	.....	9:2
Plate glass, French	1	Berthler	72.00	.....	17.00	6.40	..	..	2.60	1.90	.....	6:1
" "	2	Dumas	78.85	5.50	12.05	5.60	..	..	8.50	.....	.....	7:1
" Venetian	3	Berthler	68.60	6.90	8.10	11.00	2.1	0.1	1.20	0.20	.....	5:1
White glass, goblet, Bohemia	1	"	71.70	12.70	2.50	10.80	..	0.2	0.40	0.30	.....	6:1
" French fusible tubing	1	"	69.20	15.80	8.00	7.60	2.0	..	1.20	0.70	.....	4:1
" crown	2	Dumas	62.80	22.10	.....	.....	..	..	2.60	.....	.....	5:1
Crystal, London optical	2	Berthler	59.20	9.00	.....	12.50	..	1.0	.....	0.40	28.20	8:1
" Newcastle	1	"	51.40	9.40	.....	.....	..	..	1.20	0.80	87.40	6:1
" England	3	Faraday	51.98	18.67	.....	.....	..	..	.....	.....	33.28	6:1
Flint glass, Guinand	1	"	44.80	11.75	.....	.....	..	..	.....	.....	43.05	9:2
" "	2	Dumas	42.50	11.70	.....	0.50	..	..	1.80	.....	43.50	4:1
" strass	3	"	38.50	7.90	.....	.....	..	..	1.00	.....	53.00	7:2
" enamel	4	"	81.60	8.80	.....	.....	..	..	.....	Ox. tin. 9.80	50.30	7:3
Bohemian hard glass tubing	1	Rowney	73.00	11.50	8.00	10.50	..	2.0	.....	.....	.....	6:1

The later editions of Dr. Knapp's work give the following more recent analyses by Peligot:

VARIETIES OF GLASS.	Silica.	Potash.	Lime.	Alumina.	Soda.	Oxide of tin.	Oxide of lead.	Met. copper.	Oxide of iron.
Bohemian	76.0	15.0	8.0	1.0	.....	.....	.....	.....	.....
Bohemian opal glass	80.9	17.6	0.7	0.8	.....	.....	.....	.....	.....
Venetian Aventurine	67.7	5.5	8.9	.....	7.1	2.3	1.1	3.9	8.5
Bohemian mirror	67.7	21.0	9.9	1.4	.....	.....	.....	.....	.....

The second of these is a remarkable glass, being a simple silicate of potash with 10 per cent. more silica than is contained in Fuchs's soluble glass. (See GLASS, SOLUBLE.) Particles of glass are dispersed through the semi-transparent, imperfectly melted mass. The compound is not attacked by boiling water, and does not attract moisture from the air. The ingredients of

* Relation between the oxygen of the acid and the total amount of oxygen in the bases.

glass appear to be in the proportions of chemical equivalents—results, however, obtained by practice and not by mixtures made with this view. Various causes affect the stability of the combinations and the qualities of the compounds. The alkali in window glass powdered and moistened is detected by its action upon turmeric paper, and may be partially dissolved out by long continued digestion in boiling water. Atmospheric agents sometimes remove it in part from window panes, leaving a film of silica or silicate of lime. The glass of stable windows is liable to change its appearance, and assume prismatic colors, from the action of the ammoniacal vapors upon the silica. Changes in the degree of oxidation of its metallic ingredients, which are sometimes induced by atmospheric causes, are also attended by changes of colors. Long continued cooling has the effect of changing the structure, causing it to lose its transparency and become devitrified. Its ingredients form among themselves a new arrangement of their particles, and compounds are produced which assume a crystallized structure. By remelting, the vitreous character may be restored, though with a loss of a portion of potash which was volatilized in the devitrification. In making articles of glass, and especially bottles, it is necessary to guard against this tendency to crystallize, and shorten the process of annealing on account of it. Devitrified glass was first described by Réaumur, and has hence been called Réaumur's porcelain. In consequence of the ease with which it may be made into any shape, and its tenacity and refractory nature, not unlike porcelain itself, it has been thought that it may be employed as a cheap substitute for this material, especially in many articles used in chemical laboratories.—The specific gravity of glass varies with its composition, from 2.4 to about 3.6, although optical glass of greater specific gravity is sometimes made, amounting in some instances to 5. Its density and also its refractive property are increased with the proportion of oxide of lead it contains. Brittleness is a quality that limits the alteration of the shape of glass within narrow bounds, after it has cooled; but when softened by heat while it is highly tenacious, no substance is more easily moulded into any form, and it can be blown by the breath into hollow vessels of which the substance is so thin that they may almost float in the air. It may also be rapidly drawn out into threads of several hundred feet in length; and these have been interwoven in fabrics of silk, producing a beautiful effect. In the soft plastic state it may be cut with knives and scissors like sheets of caoutchouc. It is then inelastic like wax; but when cooled its fibres on being beaten fly back with a spring, and hollow balls of the material have, when dropped upon the smooth face of an anvil from the height of 10 or 12 ft., been found to rebound without fracture to one third or one half the same height. It has the valuable property of

welding perfectly when red hot, and portions brought together are instantly united. When moderately heated it is readily broken in any direction by the sudden contraction caused by the application of a cold body to its surface. It is also divided when cold by breaking it along lines cut to a slight depth by a diamond, or some other extremely hard-pointed body of the exact form suited for this purpose; and it may be bored with steel drills, provided these are kept slightly moistened with water, which forms a paste with the powder produced. Oil of turpentine, either alone or holding some camphor in solution, is also used for the same purpose. Copper tubes fed with emery also serve to bore holes in glass. Acids and alkalis act upon glass differently according to its composition, and reference should be made to this in storing different liquids in bottles. Silicate of alumina is readily attacked by acids, and bottles in which this is in excess are soon corroded even by the bitartrate of potash in wine, and by the reaction the liquor itself is contaminated. A glass that loses its polish by heat is sure to be attacked by acids. Oxide of lead when used in large proportion is liable to be in part reduced to a metallic state by different chemical reagents, and give a black color to the glass. All glasses are attacked by hydrofluoric acid.—In 1863 a series of experiments showing the action of sunlight on glass was begun, and has since been continued, by Mr. Thomas Gaffield, a merchant of Boston, whose collection of authorities on glass and kindred subjects is more complete than any other in this country. As early as 1824 Prof. Faraday had noticed a change in color produced in glass containing oxide of manganese when exposed to the sun's rays, and this effect was attributed to the action of solar light on that ingredient. Mr. Gaffield's experiments, embracing about 80 different kinds of glass, colored and uncolored, of English, French, German, Belgian, and American manufacture, have proved that this remarkable phenomenon is not limited to glass containing oxide of manganese, but extends to almost every species of glass. That the effect is not due to heat, but solely to the actinic rays of the sun, is shown by the fact that no change of color is produced in the glass when it is exposed to heat; while on the contrary, after the discoloration has been produced by solar light, the colors thus acquired disappear under the action of heat, and the glass assumes its normal color. This process may be repeated indefinitely, the change of color being produced by solar light, and the original color restored by heat. It was also shown that the effect was not produced by air or moisture. In some specimens the change was more easily effected than in others; in some days were sufficient, in others years were required; but in almost all the change was produced. "It is very interesting," says Mr. Gaffield, "to witness any one of these series of specimens, showing, as in one of white plate, a gradual

change, commencing in a day or a few days in summer, from greenish or bluish white to a yellowish white or light yellow, a deep and deeper yellow, until it becomes a dark yellow or gold color; and in some Belgian sheet specimens a gradual change, commencing in a few weeks in summer, from brownish yellow to deeper yellow, yellowish pink, pink, dark pink, purple, and deep purple." The following statement shows the changes produced in nine different kinds of window glass by one year's exposure to the sun's rays:

KIND OF GLASS.	Color before exposure.	Color after exposure.
French white plate	Bluish white.	Yellowish.
German crystal plate ..	Light green.	Bluish tinge.
English plate	" "	Yellowish green.
English crown	" "	Light purple.
Belgian sheet	Brownish yellow.	Deep purple.
English sheet	Dark green.	Brownish green.
American crystal sheet.	Light bluish white.	Purplish white.
" " " "	Lighter " "	Light yellowish
" " " "	" " " "	green.
" ordinary sheet.	Bluish green.	No change.

The colors named above are given from an observation of the glass edgewise, when a body of color several inches in depth is seen, whereas the usual thickness of the glass varies from one fourteenth to one quarter of an inch, and shows its color easily only when a white curtain or paper is placed behind it. The partial or entire disuse of oxide of manganese in many window-glass manufactories of late years, while it has produced an article not so light in color, has made one more permanent, which the action of sunlight changes but little, if any, in color or shade. Mr. Gaffield's experiments were also extended to showing the comparative power of the different kinds of glass to transmit the actinic rays of the sun. Of colored glasses, blue was found to transmit the most and red and orange the least.—The crude materials employed in the manufacture of glass are selected with more or less care, according to the quality of the articles to be produced. The three principal elements of which crown and sheet glass are composed are silica, soda, and lime. Of these by far the largest element is silica, which is now universally supplied in the form of sand. English crown and sheet glass generally contains about 73 per cent. of silica, and 13 each of soda and lime. On the continent less sulphate is used than in England; the component parts of foreign sheet glass may be stated at 74 per cent. of silica, 11 of soda, and 14 of lime. In both cases the remainder consists of alumina and oxide of iron. To the above ingredients it is generally the custom to add a small quantity of arsenic to assist in oxidizing any carbonaceous impurities and to promote the decomposition of the other materials, and of peroxide of manganese to peroxidize and thus reduce the coloring property of the oxide of iron present. Silica is obtained in the form of quartz sand from sea beaches and from the disintegration of quartzose rocks in the interior. It was in England once procured from

flints calcined and ground to powder, whence the name flint glass. The purest and best sand in the world for manufacturing glass is from Lanesborough, Mass., and other portions of Berkshire county. Some of it is exported to Europe, where it is known as the "Berkshire white sand," and there used in making the best qualities of glass. The grains are remarkable for their purity; in the mass they appear white, but under the microscope each grain is limpid like a clear quartz crystal. Other qualities are procured in various parts of the country. Next to the American sand in quality is that obtained from Fontainebleau in France, and much used by the French manufacturers. It is almost entirely free from iron, and is well adapted for the manufacture of white glass. The sand used by the extensive establishment of Chance and co., near Birmingham, England, is from Leighton Buzzard, Bedfordshire. Lime may be used either in the state of quicklime or in limestone of the purest qualities. Common wood ashes have been used to furnish potash, and ashes of sea plants to furnish soda; but these have been replaced by the crude alkalis obtained from them and other sources, and for some purposes refined pearl ash is employed. The carbonate of soda is also extensively prepared from common salt; and at Newcastle, England, black bottles are made from rock salt and sand from the bed of the river, with carbonate of lime of the soap works and the tank waste of the alkali makers. Sulphate of soda, the waste product of many chemical works, is successfully used, except for plate glass. Although glass can be produced from sand and alkali without any other addition, lime is a very important element, as giving to it hardness and insolubility. In flint glass this ingredient is replaced by lead, which gives greater brilliancy to the glass than lime, but, in consequence of the difference between its specific gravity and that of the other materials, is the cause of innumerable striae. Saltpetre and binocide of manganese and arsenic also are often introduced into the mixtures with the view of promoting the same object. Alumina and oxide of iron are commonly not intentionally used; they come from the impurities of the other materials. Waste glass, called cullet, forms a considerable proportion of the raw materials in some works; it promotes the fusion and the chemical union of the silica and bases mixed with it, but must be well sorted, so that no qualities be introduced inferior to that intended to be made.—In melting glass, the raw materials, thoroughly ground, mixed together, and sifted, are well incorporated with from one quarter to one third of their weight of broken glass before being introduced into the melting pots. These are already heated to a white heat in the furnace, and receive only two thirds of a charge at a time, more being added as the first portion melts down. The pot being at last filled with the melted "metal," the heat is raised as rapidly as possible, and the progress

of the operation is judged of by the workmen dipping iron rods from time to time into the mixture and examining the appearance of the drops withdrawn. A nearly homogeneous product, which becomes transparent on cooling, indicates that the most refractory ingredients have been all dissolved. Their mixture has been facilitated by the continual disengagement of carbonic acid gas, which in its escape caused the whole to be thrown into ebullition. Some of the gas remains in the mass, rendering it spongy and full of vesicles. Unless in the manufacture of the finer qualities of glass, for which the purest materials are employed, there is also a scum, called glass gall or sandiver, floating upon the surface, consisting of the insoluble matters, and the sulphates of soda and lime not taken up by the mixture. This is removed by ladling, and the "metal" is next fined, which is done by increasing the heat to the highest degree, and keeping the contents of the pots in a state of perfect fluidity from 10 to 30 hours; in this time the bubbles disappear and the insoluble matters settle to the bottom. The furnace is then allowed to cool until the metal has become viscid, so that it may be taken out and worked; and it is afterward kept at sufficiently high temperature to maintain the glass in this condition, that it may be used as required. The arrangements of the great circular glass furnaces, with their central fire surrounded with eight to twelve pots, each reached by its own arch under the general dome, admit of enough material being melted at once to employ all hands the first four working days of the week, the men working day and night in six-hour shifts. The materials of the furnaces and pots, in order that they may withstand the excessive heat and the action of the various melted ingredients, must be carefully selected from the most refractory substances, and the work must be most skillfully executed. The construction of the great melting pots is an object of special solicitude, and the placing of a new one in the furnace while this is in operation is a task of no little apparent difficulty and danger. In England

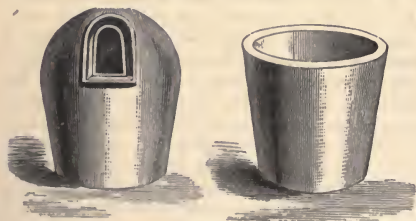


Fig. 8.—Melting Pots.

they are made of the best Stourbridge fire clay, mixed with about one fifth part of ground potsherds. The work is done entirely by hand, no machinery having yet been invented for that purpose. An average-sized pot is about 4 ft. high, 4 ft. in diameter at top, and somewhat

smaller at the bottom, and will contain about 25 cwt. of melted glass. The average duration of a pot in the furnace is about eight weeks. In the case of window and ordinary bottle glass, the pot is a plain round vessel open at the top; but in melting flint glass, it being necessary to protect the metal from all external impurities, the top of the pot is made in the form of an arch or hood, with a small opening on one side near the top, which corresponds with the nose hole of the furnace, and from which the workman withdraws the melted glass. Ordinarily two kinds of furnaces are used in addition to the annealing oven, one for melting the glass, and the other for reheating it at different stages during the process of manufacture. One of the most important improvements in the manufacture of glass has been the adoption of the Siemens regenerating gas furnace. (See FURNACE.) The novelty of this system consists in taking up the waste heat from the furnace in large chambers, and using it for raising to a higher temperature the elements of combustion. The whole of the fuel, except the inorganic portions, is converted into gas, not in the furnace itself, but in adjacent "producers." The gas and air passing through separate chambers, and having each been heated to a high degree in the waste-heat chambers, meet on entering the furnace, and there ignite, producing a heat of wonderful intensity. The advantages of this system are a greater intensity of heat produced from less fuel, and, what is very important in the manufacture of glass, a degree of cleanliness which cannot be attained by the older methods of melting. The intensity of the heat produced is indicated by the fact that in a sheet-glass furnace containing 1,800 cubic feet, materials for about 16 tons of glass in eight large pots are melted and refined into a liquid mass in 25 hours.—Such is a mere outline of the means employed to bring the materials of glass into their desired combination. The production of each kind of glass is a separate branch of manufacture, involving many curious details and processes, too numerous even to be named in this account. The tools employed are few and simple, and differ but little from those described in the work of Blancourt "On the Art of Glass," published in London in 1699. The first in importance is the pipe or blowing tube, made of wrought iron, 4 or 5 ft. long, with a bore from $\frac{1}{4}$ to 1 in. in diameter, a little larger at the mouth end than at the other. It is a long hand, partly covered with wood, with which, the end being heated red hot, the workman reaches into the pot of melted matter and gathers up the quantity he requires, and which afterward holds the article in the manipulations to which he subjects it; and it is at the same time the air tube through which the breath is forced to expand the vessel, or through which water is sometimes blown to produce the same effect by the steam it generates. A solid rod of iron, called a puntie or pontil, serves to receive the

article upon its end when freed from the pipe, adhesion being secured by the softness of the glass or by a little red-hot lump already attached to the punty. Spring tongs, like sugar tongs, are used to take up bits of melted glass; and a heavier pair, called pucellas, furnished with

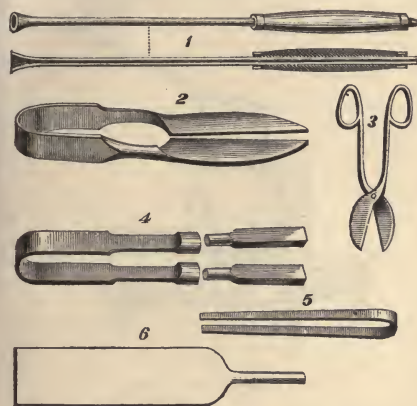


Fig. 9.—Tools used in Glassmaking.

1. Pipe or blowing tube. 2. Pucellas. 3. Shears. 4. Pucellas with wooden blades. 5. Spring tongs. 6. Battledore.

broad but blunt blades, serve to give shape to the articles as the instrument in the right hand of the workman is pressed upon their surface, while, seated upon his bench, he causes with his left hand the rod holding the article to roll up and down the two long iron arms of his seat, upon which it is laid horizontally before him. At the same time the vessel is also shaped from the interior as well, and is occasionally applied to the opening of the furnace to soften it entirely or only in some part to which greater distention is given by blowing. The pucellas are sometimes provided with blades of wood, as at 4, fig. 9. Another important instrument is a pair of shears, with which a skillful workman will cut off with one clip the top of a wine glass, as he twirls it round with the

measure stick are at hand for measuring; and a slender rod of iron forked at one end is used to take up the articles, and carry them when shaped to the annealing oven, in which they are left for some time to be tempered. (See ANNEALING.) The marver (Fr. *marbre*, marble) is a smooth polished cast-iron slab, upon the surface of which the workman rolls the glass at the end of his tube in order to give it a perfectly circular form. Those used in the manufacture of common black bottles are furnished on one edge with several concavities, in which the mass of metal taken from the melting pot is first roughly shaped as it is rolled over and over and made to swell by gentle blowing. One of the most ordinary forms into which glass is manufactured is that of bottles, which are made in moulds by the process of blowing, the kind of glass generally used being the ordinary green or window glass, and flint glass. The method of making bottles is described and illustrated in the article BOTTLE. Bottles for champagne and aerated waters are made of extraordinary strength, and are sometimes tested by the pressure of water before being used.—Of the various kinds of glass in common use, none require more care to insure the purity of the materials employed than the crystal or flint glass, of which are made many choice articles for domestic purposes, some of which are subjected to the processes of cutting or grinding and polishing. It possesses the properties of great transparency and high refractive power, which fit it for lenses for optical instruments. Flints calcined and ground were formerly used to furnish the silica, but pure sand is now generally used in its stead. Oxide of lead enters largely into its composition, and to this are due its brilliancy, density, and comparative softness. The oxide should be especially prepared to insure its purity. Oxide of zinc has been found to produce similar effects. The fusion must be rapid and at intense heat, and this must be reduced as soon as the metal is thoroughly melted and refined by the escape of the bubbles of gas, or the product acts upon the alumina and iron of the pot, and is thus so contaminated as to be worthless. The furnace is usually circular in form, and contains from four to ten pots, in front of each of which there is an opening for the workman. In the manufacture of articles of domestic use made of flint glass two processes are in use, blowing and pressing, the latter being very common in the United States. By the former method a mould is sometimes used, as in the case of bottles, when the operations are similar to those described in working ordinary green glass; or the article may receive its symmetrical form from the skill of the workman unaided by any mould. This process may be illustrated by describing how a wine glass in three parts is made. The workman, having gathered on the end of a blowpipe the requisite amount of glass (1, fig. 11), rolls it on the marver and expands it by blowing into the tube until it assumes the form shown at 2, and after-

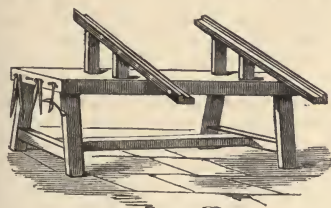


Fig. 10.—Glass Maker's Chair.

rod to which it is attached held in the left hand. The edge softened in the fire is then smoothed and polished. Besides these a wooden utensil called a battledore is employed, with which the glass is flattened by beating when necessary; compasses and calipers and a

ward, being flattened at the end with the battledore, that at 3. A lump of glass is now attached to the flat end of the bowl (4), which the workman with the pucellas, while rotating the pipe on the long arms of the chair in which he sits, transforms into the shape shown at 5. A globe is now attached to the end of this stem (6), which is afterward opened and flattened into the form represented at 7. A punty tipped with a small knob of hot glass is next stuck to the foot of the wine glass, which is severed from the blowpipe at the dotted line shown at 8. The top of the glass is then trimmed with shears (9), after which it is flashed and finished as at 10. It is now severed from the end of the punty by a sharp blow and carried by a boy to the annealing oven on the end of a forked rod. In the manufacture of articles by the method of pressing, a hollow mould is used made of steel or iron, with its interior surface so designed as to give the object the required shape and figuration. This mould may be in one piece or consist

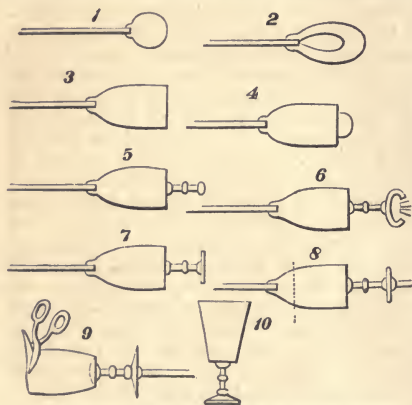


FIG. 11.—Process of Making a Wine Glass.

of several parts, which are opened when the moulded glass is taken out. The process will be illustrated by describing the production of a tumbler. A lump of glass is gathered from the pot on the end of a punty by the "gatherer," and being held over the open mould, a sufficient quantity is cut off with a pair of scissors by another workman and drops into the mould. This is now pushed under a hand press, and a smooth iron plunger is brought down into the mould with such force that the hot glass is made to fill the entire space between the inside of the mould and the plunger, whose size and shape are the same as those of the interior of the tumbler. The plunger being raised up, the mould is taken from the press and turned over, when the tumbler is made to drop out bottom side up. A punty with a piece of hot glass at one end is now attached to the bottom of the tumbler, which is heated at another furnace and smoothed by being skilfully

rubbed with a wooden tool while rotated on the arms of the workman's chair; after which it is taken on a fork to the annealing oven. By this process articles can be produced with a rapidity not attainable in the case of blown glass, and therefore with less cost; but the



FIG. 12.—Hand Press.

latter is generally preferred.—The glass commonly used for window panes is one of the hardest varieties, and of unsuitable quality for shaping into vessels or manufacturing by cutting or grinding. Besides plate glass, which is also used for windows of a more expensive character, there are two kinds of window glass, known as crown and sheet from the different processes of manufacture; the former being first blown into a globe or sphere and flattened out into a circular disk, while the latter is formed into a cylinder which is afterward opened out into a sheet. In making crown glass, the workman gathers from the pot on the end of a blowpipe the requisite amount of molten glass, which is usually about 9 lbs. The pipe being cooled to admit of handling, the lump is rolled upon the marver to give it a conical form, and a boy blowing at the same time through the tube causes the glass to swell. It is now heated by holding it in the furnace, and is then again rolled and enlarged by blowing. The most of the glass is worked down to the end of the conical or pear-shaped lump, the upper part being hollow. The solid end is called the bullion. This being softened in the furnace, the tube is laid across a rest and twirled around, while the glass is blown into a globe. During the expansion it is important to keep the bullion point in a line with the axis of the pipe. This is done by a boy holding against the bullion point a piece of iron terminating in a small cup, while the workman constantly twirls and blows through the pipe resting upon an iron support. The globe at the end of the tube is now pointed toward the flame of the furnace, and being constantly twirled, the end toward the fire flattens out, the bullion point still forming a prominence of thicker metal in the

centre. To this centre a punt with a lump of molten glass at its end is next attached, and the blowing pipe is separated by applying a piece of cold iron around the nose. As it breaks away it takes a portion of glass with it, leaving a circular opening. Taken up by the punt, the glass is held with the nose (or portion to which the blowing pipe had been attached) presented to the nose hole of the furnace. Here it is softened almost to melting, while it is all the time twirled around; it is then presented to the flame issuing from the great circular opening of the flashing furnace, the man holding it being protected from the fire by a covering over his head and face. Rapidly revolving in this flame, the opening in the end grows larger; the heated air within prevents the two opposite faces of the flattened spheroid from coming together, and the centrifugal force is constantly enlarging its diameter. The opening rapidly increases, until the glass becomes a flat circular disk, which being removed from the fire is kept rapidly revolving until it is cool enough to retain its form. The punt is then cracked off, and the disk or table is removed upon a fork to the annealing oven and set upon edge with the rest, arranged in rows and supported by iron rods so as not to press against each other, and the thicker part in the centre, called the bullion point or bull's-eye, also keeping the tables apart and open for the circulation of air. The annealing is completed in from 24 to 48 hours. Tables are thus commonly made of 54 inches diameter, and some have been produced of 70 inches; but the difficulty of manipulation and the uncertainty of the result render the making of very large sizes unprofitable. A pot containing half a ton commonly produces 100 tables; and in the crown glass houses it is customary to empty eight such pots in three days every week. From the annealing kiln the tables are taken to the warehouse and sorted according to their different qualities and defects. Each one is then laid in turn upon a "nest" or cushion, and is divided by the diamond into two pieces, the larger one containing the bull's-eye. These are next cut up into rectangular panes. The shape and the bull's-eye involve considerable waste in cutting; and numerous other defects are found in many of the sheets. These, however, are compensated for by the remarkable brilliancy of surface peculiar to glass made in this way, which is attributed by some to the influence of the marver, and by others to the effect produced by flashing the surface. Crown glass is also free from the undulations, or cockles, which often disfigure the surface of glass made by the cylindrical process.—In the manufacture of sheet glass two furnaces are generally used, one for melting or making the glass, and the other for reheating it during the process of blowing. The latter is usually of an oblong form, with four, five, or six holes on each side for as many workmen. On each side of this furnace is a pit about 7 ft.

deep, 16 ft. wide, and as long as the furnace; over this at intervals of about 2 ft. are erected in front of each hole of the furnace wooden stagings or platforms, upon which the workman stands when swinging the cylinder to and fro and over his head. The manufacture of this kind of glass may be divided into three processes: 1, blowing the cylinder; 2, flattening it out into a sheet; 3, polishing the sheet. The first step is to gather from the pot a lump of melted glass of the required weight, which experience enables the workman to do with great accuracy. Dipping the end of a blowpipe into the melted metal and twirling it round, he gathers a pear-shaped lump of 2 or 3 lbs. After this has cooled to a dull red, it is again dipped into the glass in the pot, and a larger amount withdrawn. Thus by degrees a sufficient quantity is collected, usually about 20 lbs., to produce a sheet of glass of the required size. When this mass has become somewhat cooled, the workman places it in a block of wood so hollowed as to allow the lump of glass when placed upon it to be



FIG. 13.—Blowing Cylinder Glass.

blown to the required diameter of the cylinder. Here, while a stream of cold water is turned upon the block to prevent the wood from being burnt and the glass from being scratched, the workman revolves the pipe, and blows through it, occasionally raising it to an angle of about 75° , until he has formed a hollow pear-shaped mass, with its largest diameter, which is the same as that of the finished cylinder, next to the pipe. It is now taken to the blowing furnace, where after being heated it is swung to and fro in the pit and round in a vertical plane over the head of the workman, who stands upon the platform above mentioned and keeps the lengthening cylinder full of air by occasionally blowing through the tube. Uniformity of thickness and of diameter, which was determined by the wooden block, is secured by the skill of the workman, who when the metal runs out too freely holds the cylinder vertically

above his head, still keeping it well filled with air. This operation is skilfully continued until a cylinder is produced about 11 in. in diameter and about 50 in. long, closed at one end and attached to the blowpipe at the other. The next step is to open the end of the cylinder, which the workman does by filling it with air and, after closing the aperture of the pipe with his thumb, exposing the end to the heat of the furnace. The heat expands the air in the cylinder, which bursts open at the end where the glass is the softest. The aperture thus made is widened to the required diameter by rapidly revolving the cylinder at the furnace hole, the pipe resting on an iron support, and subsequently holding it in a vertical position with the open end downward until the glass is cooled sufficiently to retain its shape. The cylinder is now laid upon a wooden rest, or trestle, and detached from the pipe by touching with a piece of cold iron the pear-shaped neck near the nose of the pipe, and gently striking the pipe; an opening about three inches in diameter is thus formed. This end, the cap of the

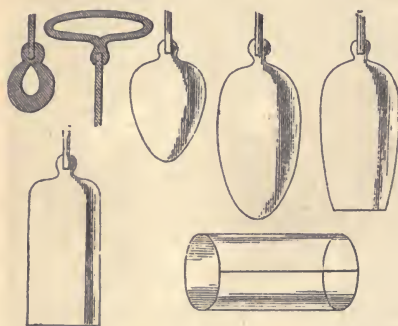


FIG. 14.—The Cylinder in Different Stages of Manufacture.

cylinder, is now taken off by winding around it a thread of hot glass, and after removing it applying a piece of cold iron to any point which the thread covered. After trimming the other end by cutting off about two inches in length with a diamond, the cylinder is split open longitudinally by drawing along its inside surface a diamond attached to a long handle and guided by a wooden rule. Formerly this splitting was done with a red-hot iron, which is still sometimes used. The cylinder is now taken to the flattening oven, where it is placed, with the slit uppermost, upon the flattening stone, from the irregularities of whose surface it is protected by a sheet of glass. The cylinder soon becomes heated and opens out into a wavy sheet, the movement being accelerated by the iron rod of the workman. The surface of the sheet is next rubbed with a piece of wood attached to the end of an iron rod for the purpose of removing the irregularities of the surface. The flattening stone is now moved on wheels to the adjoining annealing oven, where the sheets are

placed for annealing, which usually requires from 24 to 36 hours. From the annealing oven the sheets are taken to the warehouse, where they are smoothed, polished, assorted, and cut into panes of the required dimensions. The former method of grinding and polishing sheet glass by imbedding the sheets in plaster of Paris proved inadequate to remove the defects in the glass consequent upon the mode of manufacture. The chief of these was the undulating or wavy appearance of the surface, called cockles, which was attributed to the difference of diameter between the inner and outer surfaces of the cylinder, and which caused objects seen through the glass to be distorted. Notwithstanding the glass was made very thick after the superficial roughness was removed, the result was a thin sheet much inferior to plate glass. The ingenious process devised by Mr. James Chance for producing patent plate glass, which is now used in England and most factories on the continent, is one of the most important improvements in the manufacture. By removing the thin outer surface of the glass by this method, an evenness and a polish are secured, even on the thinnest sheet, which make it in many respects equal to plate glass, and far superior to the sheet glass produced by the old process. The improved method consists in placing the sheet to be ground and polished upon a flat surface covered with a piece of damp soft leather or cotton cloth. A slight pressure applied to the glass causes it to adhere to the surface of cotton or leather, and by thus producing a vacuum the entire sheet is firmly maintained in a flat position by atmospheric pressure. The exposed surfaces of two sheets fixed in this manner are rubbed against each other in a horizontal position by machinery, emery and water being constantly supplied to keep up the friction. Both sides of the sheet are polished in this manner, with only a slight diminution of the thickness of the glass. After the removal of the sheets from these surfaces, they resume by their own elasticity their original shape, which is often more or less curved. The final polish is given to the sheets by a process similar to that used in polishing plate glass. In each process through which the glass has passed, it was exposed to some imperfection, and some of the sheets bear the peculiar defects of them all and are of little value; others are suitable for inferior uses, and but few are perfect. The wide difference between the quality of the best and the worst sheets is indicated by the fact that the former are valued at three times more than the latter. The same kind of material is used in the production of both crown and sheet glass. The remarkable brilliancy of surface of the former gives to it a certain advantage over sheet glass; but the larger size easily attained in making the latter gives it the supremacy in commerce. Of crown glass it is difficult to obtain panes of 34×22 in., while the usual size of the sheets of cylinder glass is 47×32 in., and

cylinders are occasionally blown 77 in. in length, requiring about 38 lbs. of glass. The largest sizes are only produced by the most skillful workmen. The relative antiquity of the two processes of making crown and sheet glass is involved in no little obscurity. The cylindrical process is the only one mentioned by Theophilus, who is supposed to have lived in the 12th century, and this method was long retained by the Venetians and the Bohemians, as being best adapted to the production of their colored glasses on account of the uniformity of thickness and of color secured. But in the north of Germany, France, and England, it fell into disuse, and the rotary principle prevailed exclusively. Subsequently the latter was abandoned on the continent, but held its supremacy in England, where crown glass was used for houses of the better class, while the use of sheet glass was limited to inferior dwellings. In 1832 the improved process of making cylinder glass was introduced into England from France, and subsequently the improved method above mentioned of polishing the sheets was adopted. The cylindrical method is the one now in general use in England, much of the glass being known in commerce as patent plate.—The building or factory for the manufacture of plate glass is generally of very large size. That of the British plate-glass works at Ravenhead, where it is called the foundry, is 339 ft. long by 155 wide; while the famous *halle* of St. Gobain in France is 174 by 120 ft. In the centre is the square melting furnace, with openings on two parallel sides for working purposes, while along two sides of the great building are arranged annealing ovens, which are sometimes 30 by 20 ft. in order to receive the immense plates that are to be annealed. Two kinds of pots are used, the ordinary one, open at the top, for melting the glass, and cisterns or cuvettes, in which the molten glass is carried to the casting table. In France the cuvette is usually of a quadrangular form, with a groove in each of its sides, or, as in the case of the larger cisterns, in two parallel sides, in which the tongs or iron frame are fitted when the cuvette is moved. Between each two pots in the furnace are placed, according to their size, one or more cuvettes. In some establishments the cuvette is not now used, the metal being poured from the pot in which it is melted on to the casting table. In France 16 hours are allowed for the melting, and the same time for the metal to remain in the cuvettes; but the latter term is often extended in order that the æriform bubbles may escape and the excess of soda become volatilized. Toward the last the temperature is allowed to fall, and the glass then acquires the slight degree of viscosity suitable for casting. The molten glass is transferred from the pots into the adjacent cuvettes by means of wrought-iron ladles with long handles. When the glass is in the proper condition to be cast, the "tongs carriage," consisting of two powerful bars of

iron united like two scissors blades, and resting upon two wheels, is pushed into the opening made in the furnace, and the cuvette is clamped in the quadrant formed at the extremity of the tongs, two workmen manipulating the handles at the other extremity. The cistern thus taken from the furnace, while filled with molten glass, is placed on another carriage and quickly conveyed to the casting table. This consists of a massive slab, usually of cast iron, supported by a frame, and generally placed at the mouth of the annealing oven. At the Thames works in England the casting plate is 20 ft. long, 11 ft. broad, and 7 in. thick. Formerly these tables were of bronze, and the great slab of St. Gobain of this alloy weighed 50,000 lbs.; but cast iron was found less liable to crack, and is now generally used for this purpose. On each side of the table are ribs or bars of metal, which keep the glass within proper limits, and by their height determine the thickness of the plate. A copper or bronze cylinder about a foot in diameter, resting upon these bars, extends across the table. After being heated by hot coals placed upon it,

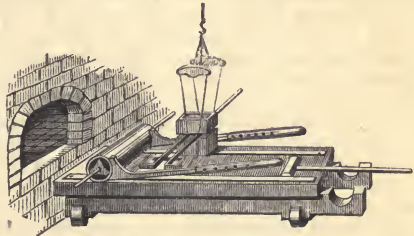


FIG. 15.—Casting Table.

the table is carefully cleaned preparatory to casting. The cistern containing the melted glass is raised from the carriage on which it was brought from the furnace by means of a crane, its outside carefully cleaned, and the glass skimmed with a copper sabre. The cuvette is now swung round over the table, over which a roller covered with cloth is drawn to remove all impurities, and the molten glass poured out in front of the cylinder, which being rolled from one extremity of the table to the other spreads out the glass in a sheet of uniform breadth and thickness. The operation is a beautiful one from the brilliancy of the great surface of melted glass, and the variety of colors exhibited upon it after the passage of the roller. While the plate is still red hot about two inches of its end is turned up like a flange, against which an iron rake-like instrument is placed, and the plate is thrust forward into the annealing oven, the temperature of which is that of dull redness. Another plate is now immediately cast upon the hot table, and the annealing oven when filled is closed and left for about five days to cool. The process of casting is done so systematically and with such despatch in a well regulated estab-

ishment, that the glass has been taken from the furnace, cast, and put into the annealing oven in less than five minutes. From the annealing oven the plates are taken to the warehouse, where they are carefully examined to see how they may be cut to the best advantage. In different manufactories and at different times various processes have been in use for grinding and smoothing the surface of plate glass, but the principle has been the same in all, viz.: rubbing the surface to be smoothed with another surface either of glass or iron, and at the same time applying sand or emery of different degrees of fineness and water between the two impinging surfaces. One of the most approved methods of grinding and smoothing the plates was introduced into England in 1856, and adopted in the British plate-glass works. This apparatus consists of a revolving table, 20 ft. in diameter, fixed upon a strong cast-iron spindle, and capable of running at an average speed of 25 revolutions a minute. Above the table frames are arranged to hold the plates of glass, which are laid in a bed of plaster of Paris, with the face to be polished resting upon the table. These frames also revolve on their centres by the friction of the table upon the glass, slowly, but so as to present each side of the plates they hold to an equal amount of rubbing as they are moved nearer to the centre of the table or further from it. Sand and water are applied to facilitate grinding down the glass. The grinding by this process is found to be even and equal, and the machinery to work smoothly and steadily from the facility with which the plates accommodate themselves to the power applied. After grinding they are smoothed with emery powder of finer and finer qualities, and are thus prepared for polishing. By the process above described the grinding and smoothing are done by the same machine; but formerly two sets of apparatus were required for this purpose. By grinding the surface of the plate is made true, but presents a rough appearance which is removed by the process of smoothing. At this stage it is somewhat opaque, and this defect disappears after the final process of polishing. This is performed chiefly by machinery. The plate of glass having been fixed upon the table by means of plaster of Paris, the surface is subjected to the action of a series of wooden blocks covered with felt and attached to a frame by which they are made to move over the surface of the glass. At the same time a polishing powder, generally red oxide of iron, is applied, while the friction may be increased by adding weight to the rubbers. Polishing sometimes brings out defects which were before concealed; the plates are consequently again assorted, and, if need be, reduced to smaller sizes. (For the methods of silvering them, see MIRROR.) Bending the large plates or the smaller sheets of glass for the purpose of fitting them for bow windows, &c., is an especial branch of the manufacture. A core of refractory material

and suitable shape is introduced upon the floor of the furnace; and upon this is laid the sheet to be bent, which as it softens by gravity conforms itself to the shape of the bed upon which it is laid. The value of plate glass varies greatly with the size. In the United States the price of a plate of standard British or French glass, 5 x 3 ft., is about \$35; but when the dimensions are double, the plate being 10 x 6 ft., the price is increased to about \$175. A plate 14 x 8 ft. is valued at about \$500. —No glass is of such importance in the arts as that of which the lenses of optical instruments are made. Both flint and crown glass are applied to this use, but each of them has its defects. The former, from the great difference in the densities of its ingredients, is with much difficulty obtained of homogeneous structure, an essential requisite in all glass used for optical purposes; and the latter is difficult to procure of uniform composition and texture, from the high temperature required for its fusion and the consequent tendency to devitrify in cooling; or if this is obviated by an increased proportion of alkali in the composition, the excess of this causes attraction of moisture from the air and a damp surface to the lens. The best flint glass is subject to defects, chief among which are undulatory appearances called *striae*, resulting from a want of uniform density in the glass, and tending to refract and disperse in different directions the rays of light passing through it. These defects are of great importance when the glass is to be used for optical purposes. In 1753 John Dollond, an English optician, first began the construction of achromatic object glasses, formed of two kinds of glass of different density, in accordance with the theory announced not long before by Euler. For this purpose Dollond used fragments of flint and of crown glass, but did not succeed in making object glasses with a larger aperture than 2 or 3 in. in diameter; and when the need of telescopes of greater magnifying power was strongly felt, it was difficult to produce flint glass sufficiently free from *striae* for a lens 4 in. in diameter. The scientific bodies of France and England offered prizes for the attainment of this result, and the most renowned glass manufacturers at the end of the last and the beginning of the present century endeavored to solve the problem. This was done by Guinand of Switzerland, a man not conversant with science, nor even a glass manufacturer, but an optician. By methods of his own he made the furnaces, crucibles, and mixtures he employed, and produced the glass, which he shaped and polished, giving without knowledge of mathematics the requisite proportion to the curves of its surface, and completed lenses of flint glass of great perfection of structure, 9 in. in diameter. The secret of his success in making the glass is believed to have consisted in keeping the mixture agitated by stirring when at its greatest liquidity, and then suffering it to cool and anneal in the pot. From

the most perfect portions of the comparatively homogeneous mass thus obtained, the lenses were cut out by a process similar to that of sawing blocks of stone. By one of the sons of Guinand the secret was imparted to M. Bontemps; and in 1828 lenses were made in France of 12 to 14 in. diameter. In 1848 Bontemps went to England, and in conjunction with the Messrs. Chance and co. made disks of flint and of crown glass larger than any before produced. At the exhibition in London in 1851, a disk of flint glass was exhibited by Messrs. Chance and co. 29 in. in diameter and weighing 2 cwt.; and at the Paris exposition in 1855 they exhibited one of the same diameter made of crown glass. One of these was afterward sold to the French government for £1,000. They are of pure color, and of such homogeneous structure that the light is transmitted without polarization. Prof. Faraday, one of a committee appointed by the astronomical society of London to experiment upon the means of producing optical lenses, while Guinand's secret method of making these 6 in. in diameter was exciting the admiration of the scientific world, discovered the heavy glass called by his name (composed of protoxide of lead 104 lbs., silicate of lead 24, and dry boracic acid 25), which has proved of considerable importance in investigations connected with the polarization of light; but its liability to change unfits it for general optical uses. Lenses both of flint and of crown glass are used in the object glasses of achromatic telescopes, serving by their combination to counteract the unequal tendency of each to disperse the rays of light. It seems to be conceded by scientific men that the glass best adapted to achromatism would be a flint glass possessing a smaller refractive power and a larger dispersive index, and a crown glass having, conversely, a greater refractive power and a less dispersive index.—The annual production of plate glass in Europe may be stated in round numbers at upward of 10,000,000 sq. ft., of which about 4,000,000 sq. ft., valued at about 28,000,000 francs, is produced in France, 3,750,000 in England, 1,500,000 in Germany, and 1,000,000 in Belgium. The industry is limited to a few large establishments, there being six each in France and England, and two each in Germany and Belgium. In addition to the above, large quantities of rough plate glass are made in England for horticultural and other cheap purposes. About 15,000,000 sq. ft. of window glass, of the value of about 15,000,000 francs, is produced annually in France, and about 100,000,000 bottles, valued at about 20,000,000 francs; the production of flint glass amounts to about 15,000,000 francs, and of ordinary table glass about the same. The entire production of the country exceeds 75,000,000 francs. The exports of glass from England in 1872 were 2,131,924 sq. ft. of plate glass, valued at £243,780; 113,004 cwt. of flint, valued at £300,484; 760,836 cwt. of common

bottles, valued at £373,138; and other kinds of glass to the value of £204,593. The latest statistics on the manufacture of glass in the United States are afforded by the census of 1870, as follows:

KINDS.	No. of establishments.	Hands employed.	Capital.	Annual products.
Cut.....	29	285	\$136,700	\$470,875
Plate.....	5	200	105,700	855,350
Stained.....	18	170	148,800	297,430
Ware, not specified.	114	12,308	10,355,832	14,300,949
Window.....	35	2,859	3,244,560	3,811,808
Total.....	201	15,822	\$14,111,642	\$19,245,862

The establishments were chiefly in Pennsylvania, New York, New Jersey, and Ohio. Of the five manufactories of plate glass, three were in Ohio and one each in New York and New Hampshire. Not included in this statement is the Lenox rough plate glass company at Lenox, Mass. The importations of glass and glass ware into the United States for the year ending June 30, 1873, amounted to \$5,834,712, including cylinder, crown, and common window, \$2,759,728; cylinder and crown polished, \$21,217; fluted, rolled, or rough plate, \$34,180; cast polished plate not silvered (2,482,359 sq. ft.), \$1,550,857; cast polished plate silvered (2,392,274 sq. ft.), \$823,076; other manufactures, \$2,230,986. Of the cylinder, crown, or common window, \$2,181,044 worth came from Belgium and \$451,223 from England; of the cast polished plate not silvered, 1,955,666 sq. ft., valued at \$1,252,991, from England, 246,698 sq. ft., valued at \$155,450, from Belgium, and 39,047 sq. ft., worth \$22,963, from France; of the silvered plate, 2,297,049 sq. ft., valued at \$764,913, was the production of England.

—COLORED AND ORNAMENTED GLASS. Moulded or pressed glass never exhibits its full lustre or the clearly cut configurations of the mould. This defect is remedied by the process called cutting glass, which is in reality grinding and afterward polishing it. It is easily effected upon the soft flint glass by applying the surfaces to be cut to the face of revolving disks of iron or copper fed with emery, or, for coarse grinding, with sand and water. Stones are also used instead of the metallic disks. The marks of the rough grinding are removed by a smooth grindstone, and the polishing is then completed by wooden disks, to which pumice or rotten stone, and finally the preparation of tin and lead called putty powder, are applied. The fine polishing of chandelier drops is effected by a lead wheel supplied with fine rotten stone and water. Glass globes and lamp shades acquire their interior ground surface by the wearing action of sand placed within them, the globes being themselves introduced into the interior of a drum which is caused to rotate rapidly. Letters and designs are engraved on glass by the use of small disks of copper set in rapid revolution by means of a lathe operated by the

foot of the workman, or by machinery, and fed with fine emery mixed with oil. Lead disks are used for the polished work. The object to be engraved is skilfully pressed against the revolving wheel or disk by the workman, who is guided by the outlines of the design lightly traced upon the glass. The art of engraving was practised by the ancients. By a recent American invention glass may be engraved by means of a blast of sand directed upon it. (See SAND BLAST.) Pleasing effects are produced by engraving through an outer casing of colored glass into an interior white, transparent, or enamelled glass; this is afterward decorated with gold and painted in arabesques or other patterns. This work is chiefly the produce of Bohemia, Bavaria, and France. Etching is also applied to the ornamenting of glass, a process which is effected by the property of hydrofluoric acid to eat into the material, as described in the article FLUORINE. The glass is first covered over with a varnish that resists the action of the acid, and when this coating is dry, the lines to be etched are marked through it by means of a point. The acid is then poured on, and is allowed to remain till it has produced the desired effect. The difficulties and danger attending the use of the acid restrict this process to the ornamenting of large polished plates, and to the labelling in indelible letters of the bottles of chemists and apothecaries. Work done by this method is inferior to that done by the regular process of engraving. An improvement upon this process has been made by Maréchal, by employing solutions of the neutral fluorides of the alkalis. The addition of hydrochloric acid to these solutions disengages hydrofluoric acid, which, coming in contact in the nascent state with the silicic acid of the glass placed in the liquid, rapidly produces a clearing upon the surface exposed. The French companies of St. Louis and Baccarat have adopted this process, by which very rich and artistic designs have been produced.—The colored glasses are produced either upon the colorless composition called strass for imitations of precious stones (see GEMS, ARTIFICIAL), or by introducing the various oxides used for coloring into the materials of flints or other kinds of glass. In the latter case the coloring matter is thoroughly fused with the glass, which therefore becomes colored throughout its entire body. Pigments are also applied to the surface of glass, and sometimes by their greater fusibility are burnt or melted in. Flint glass may be employed for vessels ornamented with colors, and to 6 cwt. of it the following ingredients are added for producing the respective colors: soft white enamel, 24 lbs. arsenic, 6 lbs. antimony; hard white enamel, 200 lbs. putty, prepared from tin and lead; blue transparent glass, 2 lbs. oxide of cobalt; azure blue, about 6 lbs. oxide of copper; ruby red, 4 oz. oxide of gold; amethyst or purple, 20 lbs. oxide of manganese; common orange, 12 lbs. iron ore and 4 lbs. manganese; emerald green, 12 lbs. copper scales and 12

lbs. iron ore; gold topaz color, 3 lbs. oxide of uranium. The colors produced by the metallic oxides are found to vary with the degree of heat employed. All the colors of the spectrum may be obtained with oxide of iron; and these various results do not seem to depend upon the different degrees of oxidation, but are thought to result from variations in molecular arrangement, induced perhaps by the action of light. By another process the surface alone of the glass may be colored. This is done by first gathering with the blowpipe a lump of clear glass, which after being rolled upon the marver is dipped into a pot of melted colored glass, forming a lump of colorless glass enveloped in a coating of colored glass. This is blown into a globe or cylinder and opened out into a sheet or plate in the usual manner, one surface of which is clear and the other colored. Vessels of various kinds having colored surfaces on the outside may be produced in a similar manner. By cutting through the thin layer of colored glass to the colorless layer, a great variety of colored ornamental glass may be produced. By gathering first a lump of colored glass and then coating this with melted clear glass, the external surface of the vessel will be colorless and the inner layer colored. "Casing" is a somewhat similar process. The article of flint glass when partially blown is inserted into a thin shell of colored glass, prepared at the same time for its reception, and the blowing is continued till the inner one fills the shell, with which it is afterward well incorporated by softening in the furnace and further blowing. Several partial casings of different colors may be thus applied.—In making etched enamelled glass, the enamel substance is ground to an impalpable powder, and laid with a brush in a pasty state upon the glass. After the paste is dried, the ornament is etched out by machinery or by hand, and the glass is then softened till the enamel is vitrified and incorporated with it. From this it is removed to the annealing kiln. The flocked variety of enamelled glass is prepared by the same method, except that a fine, smooth, opaque surface, like satin, much softer and smoother than that of ground glass, is previously given to the whole surface before the enamel is applied. This variety has in great part supplanted the other, and is justly much admired for the softening of the light diffused through it, and for the delicacy and beauty of the elaborate and artistic designs with which it is ornamented.—The Venetians and the Bohemians have long been celebrated for their skill and ingenuity in the production of ornamented glass. Many of the ingenious effects produced are imitations of ancient manufacture, of which many wonderful specimens are preserved in European museums. The process of drawing out tubes is an interesting one. The workman, having gathered a lump of glass on the end of a blowpipe, expands it into a globular form with very thick walls. Another workman having

attached a punty to the opposite end, the two men separate from each other as quickly as possible, thus elongating the glass into a tube. The globe immediately contracts across the centre, which, being drawn out to the size of the tube desired, cools, so that the hotter and softer portions next yield in their dimensions, and so on until a tube of 100 ft. or more hangs between the men. It is kept constantly rotating in the hands, and is straightened as it cools and sets by placing it on the ground. It is cut into suitable lengths while hot by taking hold of it with cold tongs. The diameter of the bore retains its proportion to the thickness of the glass; hence thin tubes must be drawn from globes blown to large size, or from small ones containing very little metal. In producing canes the glass is drawn out without being blown. Tubes thus drawn out from colored glass are converted into beads by other curious processes. This branch of the manufacture is extensively practised at Murano. The tubes are drawn out 150 ft. in length, and to the diameter of a goose quill, those for the smallest beads by the workmen receding from each other at a pretty rapid trot. The tubes are cut into lengths of about 27 in. and assorted for size and color. Women or boys then take several together in the left hand, and run them on the face of an anvil up to a certain measure, and with a blunt steel edge break off the ends all of the same length, which is commonly about twice the diameter of the tubes; the bits fall into a box. These are next worked about in a moistened mixture of wood ashes and sand, with which the cylindrical pieces become filled; and they are then introduced with more sand into a hollow cylindrical vessel, which is placed in a furnace and made to revolve. The glass softens, but the paste within the bits prevents their sides from being compressed; they become spherical, and their edges are smoothed and polished by the friction. When taken from the fire and cleaned from the sand, they are ready to be put up for the market. The Vene-

ornamental articles. In making this kind of glass, pieces of plain, colored, or opaque white cane, of uniform length, are arranged on end, the different colors alternating, around the interior of a cylindrical mould. The selection and the arrangement of colors depend upon the taste of the manufacturer. The mould and the pieces having been subjected to a moderate heat, a solid ball of transparent flint glass, attached to the end of a blowpipe or punty, is placed within the mould, the various canes forming an external coating to the glass, to which they become welded. The ball is now taken from the mould, reheated, and marvered till the adhering canes are rolled into one uniform mass. This being covered with a gathering of clear glass, the lump thus formed, with the ornamental work in the interior, may be drawn into canes of any size and presenting either the natural or the spiral arrangement; the latter being effected by the workmen rotating the glass in opposite directions while drawing it out into a cane. By variously arranging the colors in this process, and by skilful manipulations, many wonderful and ingenious effects are produced. Beautiful vases are also made by the above process, the glass when prepared being blown into that form instead of being drawn into canes. The *mille-fiori* consists of a variety of ends of variously colored tubes, cut in the form of lozenges, which, having been arranged to represent flowers or other ornamental design, are enveloped and massed together with transparent glass. The lump is then worked into the required form, a very common one being hemispherical for use as paper weights. Portraits and even watches and barometers have been represented in the interior of glass; but in this case these articles and the glass have not formed a homogeneous mass, the former being arranged in a cavity of the latter. Mosaic glass is produced by arranging vertically side by side threads or small canes of variously colored opaque or transparent glass, of uniform lengths, so that the ends shall form a ground representing flowers, arabesques, or any mosaic design. This mass is now submitted to a heat sufficient to fuse the whole, all the sides at the same time being pressed together so as to exclude the air from the interstices of the threads. The result is a homogeneous solid cane or cylinder, which, being cut at right angles or laterally, yields a number of layers or copies of the same uniform design. This process was practised with great skill by the ancients, who are supposed to have produced pictures in this way; but in existing specimens, the pieces have been so accurately united by intense heat or otherwise, that the junctures cannot even be discovered by a powerful magnifying glass. *Vitro di trino* represents fine lace work with intersecting lines of white enamel or transparent glass, forming a series of diamond-shaped sections, each containing an air bubble of uniform size. In making this, a lump of glass is blown

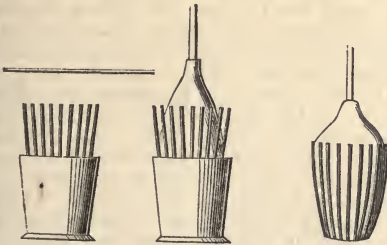


FIG. 16.—Manufacture of Filigree Glass.

tian filigree glass, which consists of spirally twisted white and colored enamel glasses cased in transparent glass, is much used for the stems of wine glasses, goblets, &c.; and when arranged side by side in alternate colors, it is manufactured into tazzas, vases, and other

in a mould, around the inner sides of which are arranged pieces of canes of the required colors, as described in the case of filigree glass, which, adhering to the glass, form ribs or flutes on its external surface. The lump, having been twisted to give the spiral arrangement to the adhering canes, is formed into a conical shape and opened at the base. This forms the inner case of the *vitro di trino*. A corresponding outer case is formed in the same manner, which being turned inside out, the projecting canes appear on the inside of the cup with a reversed spiral arrangement. One case is now placed within the other, and both being reheated are collapsed together, forming uniform air bubbles between each white enamel-crossed section. The two cases, thus welded into one, may be formed into the bowl of a wine glass or other vessel. Frosted glass, like the preceding, is one of the few specimens of Venetian work not made by the ancients; and although the process of making it is exceedingly simple, it was considered a lost art until recently practised at the Falcon glass works in England. The appearance of irregularly veined, marble-like projecting dislocations, with intervening fissures, is produced by immersing the hot glass in cold water, quickly withdrawing it, reheating the ball of glass, and simultaneously expanding it by blowing. Cameo incrustation is also of

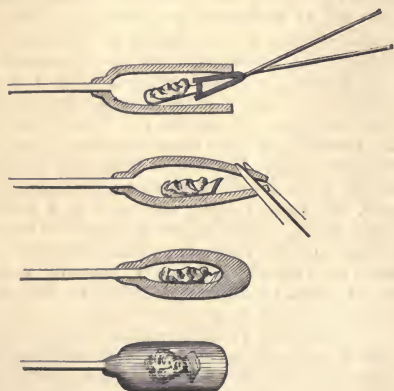


FIG. 17.—Cameo Incrustation.

modern origin, having been first introduced by the Bohemians. The figure intended for incrustation must be made of materials requiring a higher degree of heat for their fusion than the glass to be used. The figure, having been heated, is introduced into a cylindrical-shaped piece of glass, attached at one end to a blowpipe and open at the other. The open end is then closed, leaving the figure in the interior of the hollow pocket. The air is now exhausted through the hollow tube, which produces a collapse and causes the glass and figure to form into a homogeneous mass. In making "paper weights," thin sections of little ornamented rods are placed in a circular iron

mould or bed, in the form of the required design. A workman presses a piece of hot glass on the end of a puntty into the mould and takes up the design. Then another workman drops a piece of hot glass on the opposite side of the design. The whole is now taken to the furnace, where the parts are welded into a hemispherical form, which magnifies the interior design and presents a fine picture enclosed within the transparent setting. In making spun glass, the workman heats one end of a tube of glass, white or colored, by the flame of a lamp, and seizing the softened end with a pair of pincers draws out a long thread. Owing to the extreme ductility of glass, these threads can be drawn to an extraordinary fineness and length. In some cases spun glass has been made to imitate the hair of animals.—Among the most valuable treatises on the subject of glass are "Curiosities of Glass Making," by Apsley Pellatt (London, 1849), and *Guide du verrier*, by G. Bontemps (Paris, 1868), both of these authors having been for many years extensively engaged in the manufacture of glass. Among other works are those of Neri, "The Art of Glass" (translated, London, 1662); Shaw, "The Chemistry of Porcelain, Glass, and Pottery" (London, 1837); Henry Chance, "On the Manufacture of Crown and Sheet Glass" (London, 1856), and "On the Manufacture of Glass" (1868); Peligot, *L'Art de la verrerie* (Paris, 1862); Turgan, *Les grandes usines de France* (Paris, 1862-'70); Cochin, *La manufacture des glaces de Saint-Gobain de 1665 à 1865* (Paris, 1865); Gaffield, "Action of Sunlight on Glass," reprinted from the "American Journal of Science and Arts" (New Haven, 1867); Sauzay, *La verrerie* (Paris, 1868), and "Wonders of Glass Making in all Ages" (London and New York, 1870); and *Rapports du jury international* of the Paris universal exposition of 1867, vol. cxi. (Paris, 1868).

GLASS, Soluble, or Water Glass, an artificial silicate of soda or potash, or a double silicate of both these alkalies. It may be formed by fusing 8 or 10 parts of dry carbonate of soda or potash with 15 parts of white sand or powdered quartz or flint. Nearly all glass is to a slight extent soluble in water, in consequence of the alkaline matter it contains; and the solubility is increased by raising the temperature of the water, which under pressure may be carried far above the boiling point. Water holding caustic alkalies in solution will attack glass vessels containing it in consequence of the formation of a soluble alkaline silicate. It is to this quality of solubility that feldspar ordinarily owes its value as a fertilizing ingredient of the soil; and it is from the affinity of caustic lime for silica that it may be used for liberating the alkali in the feldspar. Attention was first directed to soluble glass by Fuchs as a suitable composition for rendering combustible bodies fire-proof; and in 1824 portions of the new theatre in Munich were coated with it. He also employed it in the style of fresco paint-

ing called stereochromy, for fixing the colors (see FRESKO PAINTING); and it was used not only upon plastered walls, but with success by Echter directly upon the sandstone of the Strasburg minster. Fuchs proposed to render wood fire-proof, and even linen also, by means of it; to protect surfaces from the action of the weather; to prepare with it artificial stone; and to use it as a cement for glass and porcelain. But it appears to have been most successfully applied by Prof. Kuhlmann at Lille, who employed it to prevent the decay of walls and edifices, even when built of very inferior stone, and in print works and tapestry factories for fixing colors upon cotton and paper. In England it is employed in the fabrication of the celebrated Ransome artificial stone, described in the article CONCRETE and in Dr. F. A. P. Barnard's report of the Paris universal exposition of 1867. Soluble glass is also employed by Baerle and co. of Worms for washing wool. Forty parts of water are mixed with one of soluble glass at a temperature of from 122° to 135° F., and the wool is stirred in the mixture for a few minutes. It is then rinsed in tepid water, when it is found perfectly clean, white, and odorless, without having lost any of its softness or other valuable qualities.

GLASSITES. See SANDEMANIANS.

GLASS PAINTING. The art of painting upon glass is supposed to be of Byzantine origin, and to have arisen since the beginning of the Christian era. The first authentic account of the subject is given in the *Diversarum Artium Schedula*, a work written by Theophilus, probably in the 12th century, though by some authorities its date is assigned to the 10th. The complete description given in this treatise of the process of painting on glass justifies the conclusion that the art itself must have been invented at a much earlier period; but the oldest specimens now existing do not date further back than the beginning of the 11th century. Indeed, the oldest existing specimens to which a date can with certainty be assigned has been considered by M. de Lasteyrie and other French antiquaries to be the windows in the cathedrals at Angers and St. Denis, which were painted about the middle of the 12th century. The skill of the French painters on glass was extolled by Theophilus, and to the present time France has continued to be the richest storehouse of painted glass of the earliest style. The process described by Theophilus continued to be practised until about the middle of the 16th century, when the art reached its zenith. The most eminent painters practised it, as Albert Dürer, Bernard Palissy, and others, and their works are still admired in the churches of that period, as the Cologne cathedral, York minster, and many others. But in the next century the art had entirely declined, for the reason, as Labarte suggests in his "Illustrated Handbook," that its intention was perverted in the transformation of an art of purely monumental decoration into an art

of expression. For this oil painting possessed greater resources, and glass painting necessarily fell into neglect. In some modern attempts it is remarked that the primary object of the glass in transmitting light appears to be overlooked and sacrificed in the opaque shadows introduced. In the ancient glass pictures the figures were formed of pieces of stained glass, and the shadows were laid on with dark colors and fixed in the fire. Intense colors were exclusively employed, the ruby and blue always predominant. The ground was mosaic in circles, squares, and lozenges, of massive forms, and filled with foliated ornaments in the Roman style. Over this were medallions representing historical and biographical subjects from the lives of the saints. When figures came to be introduced, they were generally grotesque and distorted; but the costumes were remarkably correct. The designs always harmonized with the style of architecture, stately and magnificent in the Norman structures, and light and elegant in those of the early English models in the 13th century. In these the brilliant positive colors were made more subsidiary, appearing in borders, geometric bands, and central points, while the ground was of a neutral gray produced by lines crossing each other at right angles. The designs were also more correctly drawn, and shaded with greater delicacy. For the violet tint always before used for the faces of the figures was substituted a gray or brown upon colorless glass. The pieces of glass were of larger size, and a single figure was often made to occupy a whole window, standing beneath an elaborate blue or red canopy. In the background, among the architectural fragmentary designs, still appeared the old Roman foliated ornaments, but intermixed with original studies from nature, a style of the art which was afterward carried to great perfection. Not only leaves, plants, and trees, but even landscapes and buildings in perspective, appeared in the latter half of the 15th century. The Scripture pieces were often explained by legends painted upon the phylacteries, and in the background were represented rich blue or red hangings of damask.—After a long decline, the 19th century has witnessed a revival in the art of painting on glass, which is now extensively practised in France, Germany, and England, the finest specimens being produced at Munich. In earlier periods it was devoted chiefly to ornamenting cathedral windows with sacred illustrations, but it is now used for general purposes of ornamentation, embracing a wide range of secular subjects. The belief in the superiority of ancient glass painting, which was even regarded by some as one of the lost arts, has been superseded by the opinion held by the highest authorities that painted glass can now be manufactured superior to the best specimens of the middle ages. Indeed, the processes then in use have been brought to light by modern research. In 1850 a series of chemical analyses was in-

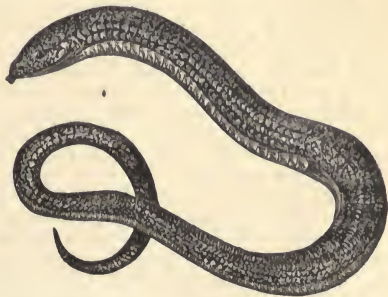
stituted by Mr. C. Winston of England, who during his life made the subject of painted glass in its antiquarian aspects a special study, and the earliest specimens were carefully analyzed. The results reached made it easy to reproduce both the quality and the color of the ancient glass.—Glass painting, which is more properly a process of staining, differs from all other styles of pictorial art, except the painting of porcelain. The colors are different, being wholly of mineral composition, and are not merely laid on the outside, but fixed by being fused into the material, undergoing in the operation chemical changes that develop the brilliancy and transparency of which the compounds are susceptible. The colors are mixed with a flux of much easier fusion than the glass, and with some vehicle, as boiled oil or spirits of turpentine. The mixture is usually laid on with a brush as in ordinary painting; and the glass being then exposed to heat, the flux melts and sinks into the body. None of the clear bright colors are perceived until the work is completed, and the artist consequently labors under great disadvantage in applying the materials that are to produce them. He is guided either by lines drawn on the back side, which show through, or by a cartoon or drawing on paper placed there. In the early use of glass for windows, especially those of churches, brilliant colors were highly esteemed, and great success was attained in the methods of coloring. A bright red color was imparted by the ancients with the protoxide of copper. In later times it was found impracticable to succeed with this on account of the tendency of the copper to pass to a peroxide and produce a green tinge; but the practice has been again introduced with success by the Tyne company in England, at Choisy in France, and in other places. The discovery of the preparation of gold and tin, called purple of Cassius, also afforded another means of producing a brilliant red.—In the history of the art two leading processes have been prominent. From the earliest period until about the middle of the 16th century the method described by Theophilus and known as the mosaic system prevailed. In this process the glass was colored in the manufacture, and blocks of different colors having been brought together, the outlines and shading of the design were produced by the application of an enamel color. About the time mentioned it was discovered that all colors besides yellow, brown, and light red, which had previously been imparted by this method, could be given to glass by means of the enamel process; but the works produced by this method were greatly inferior to those by the mosaic system. There has been a spirited controversy between the advocates of the German method of glass painting, in which enamel is used, and the English glass painters, who avoid the use of enamel as far as possible, as it sometimes scales off. It seems to be conceded that the beauty of the cathedral glass of the 13th and

14th centuries was in the brilliancy of the glass and the skilful arrangement of designs and colors, and not in any enamel work. The ordinary method of glass painting, as practised in England, is to use for the colored parts of the design pieces of glass differently colored in the process of manufacture, and to employ only one enamel color, brown, for tracing the outlines and painting the shadows of the picture upon the glass. The enamel brown, like any other enamel color, consists of coloring matter mixed with pulverized glass, called flux or enamel. When this is laid on the surface of the glass and heated in an oven or furnace, it melts, in consequence of being more fusible, while the glass is merely at a red heat; on being cooled it hardens and produces a permanent color on the surface of the glass. The general colors of the design, therefore, are not produced by the painter, but by the glass maker; the former, as has been stated, using pieces of glass already colored. The only exception to this is in the case of yellow, which is produced on the glass by applying a "stain," the principal ingredient of which is oxide or chloride of silver. On being exposed to the action of a red heat, the yellow stain penetrates the glass and imparts to it its tint, the preparation of silver being afterward brushed off. This process was discovered in the early part of the 14th century, and has been used to impart a yellow tint to uncolored and most kinds of colored glass. The various tints of yellow are the only ones that can be produced on glass without altering its surface. By putting on a second or third coating of the silver oxide and burning in, orange and red stained glasses are produced.—The process of producing a painted glass window is an interesting one. The artist first makes an outline on a small scale of the stone work of the window, within which he sketches the design, indicating the colors to be used and the general treatment of the subject. A full-sized drawing or cartoon is next made, from which a "cutting drawing" is traced, showing the lines where the strips of lead are to go, and omitting all other details. On this latter drawing, on which the colors of the design are indicated by outlines, the pieces of different colored glass are laid and cut with a diamond, each piece being cut out of that particular color or tint required. The artist now arranges the pieces of different colors in their proper places on the cartoon, and traces the outline of the design upon them. On being heated in an oven, the opaque lines vitrify and are formed indelibly on the surface of the glass. After the outlines have been thus "burnt" on, the glass is taken again to the painter, who covers the cartoon with a sheet of colorless glass, or if large a portion of it at a time. Thus having the cartoon for a guide, he arranges in their proper places on the sheet of colorless glass the pieces on which the outlines have been traced, and secures them firmly with drops of melted resin and

beeswax, or other suitable substance. The sheet of colorless glass, with the pieces thus arranged adhering to it, is placed upon an easel, and the shadows of the picture are put on with the same material as that used in tracing the outlines. The shading, however, is not traced from the cartoon, as were the outlines, but is done by the skill and experience of the painter. When the shading is completed, and the tints of yellow, if any are required, are put on, the pieces of glass are detached from the colorless sheet and again subjected to heat, for the purpose of "burning in" the shadows. If more work by the painter is required, the process is repeated, the glass being thus subjected to heat in some instances six or seven times. The work of the painter being completed, the finished pieces are taken by the "leader," who, having arranged them by the aid of the "cutting drawing" so as to form the entire design, fastens them together by means of strips of grooved lead skilfully fitted around the edges of the several pieces. If the window is a large one, as is generally the case, it is divided into parts of convenient size, which are fitted together when the window is put in its place. Bars of iron are also sometimes placed across the window at the line of junction and at other convenient intervals. This general process of producing mosaic stained glass windows has been in use from the earliest times, though it may have been modified in some of its details; and until some other method of imparting colors to glass without detracting from its transparency and brilliancy is discovered, the opaque lead lines in the design must be accepted as a necessity. In his "Art of Glass Painting," Mr. C. Winston says: "The necessity of leading a glass painting together is one of those conditions which cannot be evaded by any ingenuity. The lead work and saddle bars must be accepted as necessary parts of the composition. The design must be made with reference to them, and that glass painting must be acknowledged to be the best which admits of the leads being thrown into the outlines, and made to serve as outlines; and which by the simplicity, I might almost say roughness, of its design and execution, prevents the harshness of the saddle bars from being obtrusive. In this respect the glass paintings prior to 1550, and until the 18th century, must be considered superior to those later works in which the attempt has been made to ignore the leads and saddle bars, by leading the work together in squares independently of the outlines of the composition, or by twisting the saddle bars so as to avoid their cutting the design at regular intervals; because both methods immediately suggest the idea of a blemished picture, and make us immediately perceive how much better the work would be without leads or saddle bars. But a window cannot be constructed without them; hence it is better to adopt them as essential parts of the design; and the beautiful windows of the choir of this [Lich-

field] cathedral, which bear date between 1532 and 1539, show that a design so constituted is compatible with high pictorial effect." Another condition which must be particularly observed is the preservation of transparency in the highest degree consistent with the production of a picture. For this purpose the high lights of the window must be as free from shading as possible. Indeed, light shading throughout the entire design is one of the conditions imposed by the nature of the material. These conditions were fully recognized by the artists of the middle of the 16th century, and this fact accounts largely for the superiority of their productions to those of their predecessors. In the best glass paintings of that period there is always an abundance of light in the upper portion of the window, while in the choice of subjects and their general treatment the artist selected those that could be made the most effective with the least shading.—Among numerous works on this subject are: Lasteyrie, *Histoire de la peinture sur verre d'après des monuments en France* (2 vols., Paris, 1838-56); Gessert, *Geschichte der Glasmalerei* (Stuttgart, 1839); Ballantine, "Treatise on Painted Glass" (London and Edinburgh, 1845); Bontemps, *Peinture sur verre au dix-neuvième siècle* (Paris, 1845); Weale, "Ancient Painted and Stained Glass" (London, 1846); Winston, "Inquiry into the Difference of Style observable in Ancient Glass Paintings, especially in England, with Hints on Glass Painting" (London, 1847), and "An Introduction to the Study of Painted Glass" (Oxford, 1849); Warrington, "History of Stained Glass" (London, 1848); Fromberg, "An Essay on the Art of Painting on Glass" (London, 1851); Bielfeld, "A Guide to Painting on Glass" (London, 1856); and Winston, "Memoirs illustrative of the Art of Glass Painting" (1865).

GLASS SNAKE (*Ophisaurus ventralis*, Daud.), a North American reptile, improperly called a snake, belonging to the order *saurophidia* of Gray, and to the chalcidian or cyclosaurian



Glass Snake (*Ophisaurus ventralis*).

family of saurians of Duméril and Bibron. The head is lizard-like, sub-oval, with rounded snout, covered above with numerous polygonal plates, large anteriorly, the frontal the largest;

the tongue arrow-shaped, triangularly grooved in front, free in its anterior extremity, on which the papillæ are granular; the nostrils are near the snout, lateral, opening upward; the eyes are small, protected by two movable unequal lids; there are several rows of short conical teeth, about 36 in number, on the roof of the mouth, chiefly on the pterygoid bones; the intermaxillary teeth are conical, the maxillary simple and nearly cylindrical, about 40 in all above and 36 below; the external ear is a small oval opening just behind the angle of the mouth. There is no distinct neck; the body is elongated and snake-like, covered with small, smooth, slightly imbricated scales, disposed in circles around the body, about 120 in number; there is no vestige of anterior or posterior limbs externally, and only their rudiments internally; there is a deep groove separating the sides of the body from the abdomen, most visible during respiration, and which doubtless affords the free movements of the ends of the ribs necessary for progression. The tail forms at least two thirds of the total length, round, and tapering gradually to the tip, covered with about 140 rings of scales. Though the shape of this reptile is snake-like, the movable lids, external auditory openings, less movable vertebrae, less extensible tongue, rudimentary sternum, and above all the consolidation of the bones of the skull and jaws, sufficiently show its saurian affinities. The length varies from 2½ to 3½ ft. The head above is mottled with black and green, with a yellowish tinge on the jaws; the body and tail above are marked with longitudinal and transverse lines of black, green, and yellow, each scale marked with these three colors; the under surface is yellowish, brightest on the abdomen; some slight varieties of color are described. It is found on the Atlantic coast from southern Virginia to Florida, and as far west as the Mississippi, Missouri, and Ohio rivers; it has been seen west of the Alleghanies as far north as Michigan. From the smallness of its gape it cannot destroy and swallow large prey, like the serpents; it cannot climb nor swim, but passes its life on the surface of dry places or in natural cavities in the ground, living principally on mollusks, insects, annelids, and other small animals, and perhaps also partly on vegetable food like the sweet potato. It can move with considerable speed, and is taken uninjured with difficulty on account of the ease with which the joints of the tail are separated; the name of glass snake was given on account of this extreme fragility. The breaking of the tail into small pieces in this and in some scincoid reptiles seems to be the result of a reflex action in the spinal cord, as an irritation of this nervous centre will cause a separation even after the tail is divided from the body. Dr. Burnett ("Proceedings of the Boston Society of Natural History," vol. iv., p. 223) ascertained that the caudal muscles in this reptile do not pass from one vertebra to another, but that a portion are in-

serted into the skin, while others terminate midway between one vertebra and the next, dove-tailed as it were between the fibres sent from that vertebra, and attached to them only by the *myolemma*; so that there is no rupture of muscular fibres, but only a separation of one layer of muscles from the adjoining one, when the tail of the animal is broken; the detached portion is said to be reproduced in a year. The glass snake in its anatomical peculiarities resembles the chalcidian amphibæna and the scincoid blindworm (*anguis fragilis*).

GLASS SPONGE, or Glass Rope, a silicious sponge of the genus *hyalonema* (Gray); the name may also be properly applied to other allied genera, and especially to the *euplectella*, which will be described under VENUS'S FLOWER-BASKET. This sponge was first described and named by Dr. J. E. Gray, of the British museum, in 1835; he regarded it as a coral allied to the sea fans (*gorgonia*), an opinion to which he still adheres, against what seems to be an overwhelming mass of evidence. As usually seen, this sponge consists of a loosely twisted bundle of glassy threads, diverging at one end and converging at the other, which is more or less covered with a brown crust, studded with wart-like cylindrical elevations, terminating in radiating ridges. The threads are mainly composed of siliceous matter, and are shining, translucent, and very flexible; the fascicle varies from 12 to 20 in. in length, and is about half an inch thick, the threads ranging from the size of a bristle to that of a knitting needle. The wart-like elevations are generally regarded as polyps, of the genus *palythoa*, continuous throughout the crust, of which Dr. Gray considers the fascicle the central axis. The convergent end, in its natural state, is enveloped in a spongy mass, the fascicle on which Dr. Gray regarded as a parasite. The opinions of scientific men since Gray have been various. Prof. Brandt of St. Petersburg considered the sponge a parasite attaching itself to the polyp mass and gradually destroying it. Dr. Bowerbank regards all the structures above named as parts of one sponge, the wart-like elevations being the oscula. Prof. Schultze of Bonn represents the fascicle and the sponge mass as belonging together, the warty crust being referred to the polyp *palythoa*. Ehrenberg regards the fascicle as an artificial product of Japanese industry, and all sponges as of vegetable nature. In 1867 Prof. Loven described a little, stalked, deep-sea sponge from the coast of Norway, the *H. boreale*, which led him and naturalists since to the belief that this sponge had been represented upside down; in fact, that the glassy threads were below, mooring the structure to the sand, mud, or weeds, the sponge mass forming the upper portion; an opinion which Dr. Leidy in 1870 modified by suggesting that this sponge may be suspended by its glassy cable, thinking it highly improbable that it should be attached by or rest upon the base where the large oscula are placed. All agree that there is a sponge mass attached

to this compound animal, as the microscopic structure of the threads is perfectly characteristic of sponge spicules; their silicious character shows that they are not formed by polyps; the sponge mass at the upper end consists of an elegant tissue of dense masses of very short silicious spicules, forming a kind of felt; the terminal sponge is more or less cup-shaped, with an open conical central cavity. All but Dr. Bowerbank admit a parasite, the question being whether the polyp is a parasite on the sponge, or the sponge a parasite on the polyp. The characters of *hyalonema* will be best understood from the annexed figure. *H. mirabile* or *Sieboldi* is found in the seas around Japan, near Yokohama; *H. Lusitanicum* was found by Prof. Bocage of Lisbon off the coast of Portugal; *H. boreale*, according to Wyville Thompson not belonging to this genus but to a corticate type, was found by Prof. Loven on the coast of Norway; and this or an allied species has lately been dredged on the northern part of our own coast. Other glass sponges are *Holtenia*, figured in the "American Naturalist" for July, 1873, and *phoronema* and *rossella*, figured in the "Popular Science Monthly" for September, 1873. Where men like Gray, Bowerbank, Brandt, and Schultze entertain such different opinions, after the examination of hundreds of specimens, during a period of nearly 40 years, it is certainly very difficult to decide whether *hyalonema* be wholly a sponge, or which, if either, the sponge or the polyp, is the parasite. Dr. Leidy, in the "American Naturalist" for March, 1870, alludes to a specimen, very much like one in the possession of the writer of this article, in which the fascicle appears to have been withdrawn from the sponge and lain for some time in the sea; a shark's



Glass Sponge
(*Hyalonema Lusitanicum*).

egg is also attached near the top, and the tendrils of others are partially imbedded in the crust, which has no warty elevations; this seems to favor Dr. Bowerbank's opinion that the whole is a sponge, and that the crust is not made by a polyp.

GLASTONBURY, a market town and parish of Somersetshire, England, 25 m. S. W. of Bath; pop. in 1871, 3,670. The town occupies a peninsula, formerly an island (Avalon), in the river Brue. It derives its interest and importance almost wholly from its ruins, prominent among which are those of a famous Benedictine abbey, founded, it is said, by St. Augustin in 605, rebuilt in great splendor about a century later, and enriched by the liberality of successive princes until the time of Ethelred I. It suffered from the Danes, and before the conquest, when the Normans robbed it of both wealth and influence, had gained considerable importance and celebrity. Its half ruined walls were rebuilt by Stephen and Henry II., and its abbot was honored with a mitre and a seat among the barons in parliament. At one time it was annexed to the see of Wells, the incumbent of which was called bishop of Glastonbury. On the suppression of monasteries by Henry VIII. it enjoyed a revenue of £3,508 18s. 4½d. In 1539 Richard Whiting, the last abbot, for refusing to surrender the abbey to the king, was hanged in his robes on Torhill with two of his monks. The abbey ruins, consisting of portions of the church, the chapel of St. Joseph of Arimathea, and a building called the abbot's kitchen, are comprised in a quadrangle of 60 acres, which was once encompassed by a high wall. A reputation for sanctity clung to Glastonbury long after the reformation, and as late as 1751 10,000 invalids flocked hither in a single month, to drink from a spring said to cause miraculous cures.

GLATZ, a town of Prussia, in the province of Silesia, on the left bank of the Neisse, 52 m. S. W. of Breslau; pop. in 1871, 11,541. The town is defended by an old citadel, a modern fortress, and other works. It manufactures cotton fabrics, leather, and hosiery, and has a Roman Catholic gymnasium, a hospital, infirmary, and barracks. It was fortified as early as the 11th century, and has sustained numerous sieges. It was taken in the beginning of the thirty years' war by the Protestants, capitulated in 1622 to the imperial troops, and in 1742 to the Prussians.—The territory of Glatz was made a county of the empire in the latter part of the 15th century by the emperor Frederick III., and subsequently formed a part of the Austrian dominions, until occupied by Frederick the Great in 1742. A part of the Sudetic mountains is often designated by the name of Glatzer Gebirge.

GLAUBER, *Johann Rudolf*, a German chemist, born in Karlstadt in 1604, died in Amsterdam in 1668. He was a physician and alchemist, boasted of wonderful secrets, and was called the Paracelsus of his age. He passed his life

in his laboratory, successively at Salzburg, Frankfort, Cologne, and Amsterdam, first exhibited the production of artificial salts, and discovered the salt to which his name is given. He wrote voluminously on chemistry and alchemy, and his works were translated into English by C. Packer (London, 1689).

GLAUBER'S SALT, sulphate of soda, found native, and produced artificially. The artificial salt was named from its discoverer (see above), who obtained it in making muriatic acid. The natural salt is usually met with as an efflorescence, sometimes deposited around hot springs, as at Carlsbad and Cheltenham, or about saline ponds, as in the country between the head waters of the Arkansas and Santa Fé, on the route to the Rocky mountains. It also occurs in a cavern near a volcano on the island of Hawaii, where it is produced by the action of the volcanic heat and gases upon the sea water. It is found as an efflorescence on the limestone rocks below the Genesee falls, Rochester, N. Y. It crystallizes in forms derived from an oblique rhombic prism. The crystals effloresce in the air, and lose their water of crystallization. It is most soluble in water at the temperature of 93°-2° F., when, according to the experiments of Löwel, 412.22 parts of the hydrated salt are dissolved by 100 of water; at 77° only 98.48 parts are taken up, and at 68°, 58.35 parts. The salt has a taste cool at first, then saline and bitter. It is white, transparent to opaque, of vitreous lustre, of hardness from 1.5 to 2, and specific gravity 1.481. Its composition is represented by the formula $\text{NaO}, \text{SO}_4 + 10\text{HO}$, making its equivalent 161, and the percentage of water 55.76. It is artificially prepared by decomposing common salt by sulphuric acid (as in the preparation of hydrochloric acid, of which process it is the residue), with an excess of acid, which is taken up by the addition of carbonate of lime. It is very largely manufactured in England and France in order to prepare from it carbonate of soda and soda ash; to avoid the production of muriatic acid, a process has been introduced of making the salt by the reaction of common salt and sulphate of iron upon each other. It is also obtained as a residuum in the manufacture of bleaching salts, muriate of ammonia, &c., and from sea water, by exposing the water to intense cold, when this, the least soluble salt, separates by crystallizing.—Sulphate of soda is principally of value as a medium for obtaining the other salts of soda. Formerly it was much used in medicine as an aperient and diuretic; but sulphate of magnesia has taken its place, though it is still sometimes used in small doses in combination with other drugs. By dissolving it in hydrochloric or dilute sulphuric acid, cold is produced, by which water may be frozen in summer; and wine coolers have been made designed for its use, in which, with 12 lbs. of the salt and 10 lbs. of acid, 10 to 12 lbs. of ice have been formed in an hour. The salt is an ingredient in some kinds of glass.

GLAUCHAU, a town of Saxony, in the circle of Zwickau, 15 m. W. of Chemnitz; pop. in 1871, 22,036. It contains an old and extensive castle and several churches. Next to Chemnitz it is the most important manufacturing town of Saxony. The staple articles made here are woollen and half-woollen goods, paper, and engines. The annual exports exceed in value \$15,000,000. Glauchau has 12,000 looms, and employs many persons in neighboring localities. The population has almost quadrupled within the last 40 years, and the number of master workmen has increased from 300 in 1804 to more than 2,000 in 1874.

GLAUCUS. I. Of Potnia, the grandson of Æolus, son of Sisyphus and Merope, and father of Bellerophon. To make his mares more swift and fierce, he prevented them from breeding, and, according to some, fed them upon human flesh. This incensed the gods, and especially Aphrodite; and when Glaucus took part with his chariot and horses in the funeral games of Pelias at Iolcus, the horses in madness upset the chariot, and, according to some, tore Glaucus to pieces. He was afterward believed to haunt the isthmus of Corinth, and to frighten horses engaged in the race. One of the lost tragedies of Æschylus was named from him. II. Of Antheion in Bœotia, a fisherman who ate of the divine herb planted by Saturn, and became immortal. He built the ship *Argo*, and was her steersman. In the sea fight against the Tyrrhenians, he alone was unhurt; he leaped overboard, sank to the bottom, and became a sea divinity. He was said to visit the coast of Greece annually, and was revered by fisherman and sailors. His many loves were a favorite subject with poets. Aristotle says that he delivered oracles at Delos, which by some were more esteemed than those of Apollo. Philostratus describes a statue of him, half man and half fish. He was often represented on the stage by the Greek dramatists.

GLEIG, George Robert, a Scottish author, born in Stirling, April 20, 1796. He abandoned his studies at Oxford to join as a volunteer a regiment going to Spain in 1813, and served both in the Peninsula and in America. On retiring from the army he resumed his studies at Oxford, took his degree, was ordained, and in 1844 was appointed chaplain to Chelsea hospital, and in 1846 chaplain general to the forces. His exertions to establish a system of education for the soldiers gained for him the office of inspector general of military schools. His works are for the most part histories or novels. Of the former, "The Family History of England" (1836; 2d ed., 1854) and the "Military History of Great Britain" (1845) are most esteemed; and of the latter, "The Subaltern" (1825), "Chelsea Pensioners" (1829), and "Country Curate" (1834). His eulogistic "Mémorial of Warren Hastings" (1841) has been severely criticised. In 1858 he collected two volumes of his "Essays," chiefly from the "Edinburgh" and "Quarterly" reviews, and

in 1859 published his chief work, a life of the duke of Wellington (new ed., 1862).

GLEIM, Johann Wilhelm Ludwig, a German poet, born at Ermsleben, near Halberstadt, April 2, 1719, died in the latter town, Feb. 18, 1803. He published odes, fables, tales, and songs, which obtained for him the title of the German Anacreon. His *Siegeslied nach der Schlacht bei Rossbach* is the most famous of his battle songs. Gleim was very popular in Germany, and exercised for about 40 years a master influence on literature. He was a bachelor, but his home, kept by his accomplished niece Sophie Dorothea Gleim (celebrated in his songs under the name of Gleminde), was a favorite resort of poets and scholars. An edition of his works (7 vols., Halberstadt, 1811-'13) was completed by an 8th volume (Leipsic, 1841).

GLEIWITZ, a town of Prussian Silesia, on the Klodnitz, 40 m. S. E. of Oppeln; pop. in 1871, 12,939. It has a Catholic gymnasium, a Protestant and two Catholic churches, a synagogue, a convent, a hospital, and barracks, and is the centre of the mining and smelting industry of upper Silesia.

GLENCOE, one of the wildest and most gloomy of the Scottish glens, in the district of Lorn, Argyleshire, about 10 m. long, and enclosed by lofty mountains. The lower part of the glen near Loch Leven is cultivated and wooded, but the upper part is exceedingly rugged and barren, the mountains rising almost perpendicularly in fantastic forms, seamed with deep furrows worn by the winter torrents. A small lake, from which issues the Cona, lies in the middle of the valley. The path through the glen is lined by immense masses of rock. Near its N. W. extremity is the scene of the "massacre of Glencoe." After the revolution of 1688 many of the Scottish clans continued in arms for King James against King William. In August, 1691, the government of William issued a proclamation offering an amnesty to such insurgents as should take the oath of allegiance on or before Dec. 31. All the chiefs submitted within the prescribed time except the aged MacIan or Macdonald of Glencoe, whose tribe, a few hundred in number, inhabited this secluded valley. On Dec. 31 he went to Fort William and offered to take the oath; but the colonel in command, not being a magistrate, could not administer the oath, and referred the chief to the sheriff at Inverary, before whom Macdonald took the oath, on Jan. 6, 1692. The

earls of Breadalbane and Argyll, and the master of Stair, who were then in London, determined to avail themselves of this unintentional delay to effect the destruction of the tribe of Macdonald, to whom Argyll and Breadalbane were hereditary enemies. The master of Stair was secretary of state for Scotland, and by representing to William that Glencoe had not submitted, and that the dwellers in the valley, whom he described as a band of robbers, were the only remaining obstacle to the complete pacification of the highlands, he obtained an order for their extirpation. It was executed with horrible treachery and cruelty. On Feb. 1 a body of 120 soldiers, commanded by Campbell of Glenlyon, was sent to occupy Glencoe. Professing peace and friendship, they were received with the kindest hospitality, and for nearly a fortnight lived at free quarters in the utmost familiarity with the people. On the evening of Feb. 12 the officers supped at Macdonald's house. That same night the massacre was begun. Macdonald and two of his attendants were murdered, and his wife received such barbarous treatment that she died the next day. About 40 persons were killed that night. Detachments of soldiers were sent to guard the outlets of the valley; but they arrived too late,



Pass of Glencoe.

and many of the inhabitants escaped half naked to the mountains, where a considerable number of the women and children perished of cold and hunger. In the morning the assassins set the village on fire, and took away with them all the flocks and herds of the valley. No punishment was inflicted on the authors of this crime. A graphic account of the massacre of Glencoe is given by Macaulay in his "History of England," vol. iv., exonerating King William. Other able writers inculcate him, and the question has been very warmly debated.

GLENDOWER, or **Glendwr, Owen**, a Welsh chieftain, born in Merionethshire about 1349, died

Sept. 20, 1415. His father was Gryffydd Vychan, and his mother, Elena, was granddaughter of Llewellyn, the last Welsh prince of Wales. He studied law at the inns of court in London, and became a barrister, but soon quit the profession for that of arms. He was made squire of the body to Richard II., to whom he adhered throughout his disastrous reign. In 1387 he was knighted, and at an early age married Margaret, daughter of Sir David Hanmer. After the deposition of Richard II., he retired to his lordship of Glendwrwy in Wales. His retirement was wrongfully construed into disloyalty to the new king Henry IV., and his estates were declared forfeited, and seized by Lord Grey de Ruthyn, an Anglo-Norman nobleman whose domains adjoined those of Glendower. Glendower then proclaimed himself prince of Wales, and called his countrymen to arms. The Welsh bards espoused the cause of Glendower, and he was soon at the head of a considerable force of enthusiastic partisans. In the summer of 1400 he seized the estates of Lord Grey. That nobleman in reprisal, with the help of Lord Talbot, who had been sent to his assistance by the king, surprised the residence of Glendower, who narrowly escaped capture. Rallying his followers, he pillaged and burned the town of Ruthyn, and made such progress that the king in person took the field against him. A long contest ensued, in the course of which Glendower in 1402 made prisoner his old enemy Lord Grey, whom he compelled to pay a ransom of 10,000 marks and to marry his fourth daughter, Jane; he also captured Sir Edward Mortimer, but treated him with such kindness that he became Glendower's partisan, and arranged for him an alliance with the Percys of Northumberland. The confederates agreed to divide the kingdom among themselves. Glendower then called together the estates of Wales, and was formally crowned prince at Machynlleth. In 1403 the confederates gave battle to Henry near Shrewsbury, and were defeated, Percy being killed. Glendower in 1404 entered into alliance with France, and gained some victories; but in March, 1405, he was defeated at Grosmont castle and at Mynydd pwl Melyn, losing 2,300 men. He wandered about, hiding himself in woods and caves, until the French king sent him 12,000 men, to whom Glendower joined 11,000 Welsh, and marching into England, penetrated as far as Worcester. But after several indecisive engagements the allies retreated into Wales, and shortly afterward the French returned to their own country. For some years Glendower waged a partisan and predatory war, and at the time of his death was negotiating with Sir Gilbert Talbot, who had been sent by Henry V. to offer him and his followers a free pardon. Glendower had five daughters and several sons, most or all of whom fell in battle in 1400.

GLENGARRY, an E. county of Ontario, Canada, bordering on Quebec and the river St. Law-

rence; area, 462 sq. m.; pop. in 1871, 20,524, of whom 15,899 were of Scotch, 2,607 of French, 1,279 of Irish, and 509 of English origin. It is watered by several streams, and is intersected by the Grand Trunk and the Montreal and Ottawa Junction railroads. Capital, Alexandria.

GLENS FALLS, a village of Warren co., New York, situated on the Hudson river, which is here crossed by a bridge, at the terminus of a branch of the Rensselaer and Saratoga railroad, 46 m. N. of Albany; pop. in 1870, 4,500. The surrounding country is rugged, and in the vicinity are quarries of black marble. The river, here flowing through a ravine, descends 50 ft. over a rocky precipice 900 ft. long. The village is connected by a feeder with the Champlain canal, and contains a planing mill, two saw mills, a tannery, a brewery, a flour mill, a foundry and machine shop, and manufactories of carriages, lime, pumps, &c. Elmwood seminary, for the superior instruction of females, and Glen's Falls academy are flourishing institutions. There are two national banks, two weekly newspapers, and six churches.

GLIDDON, George Robins, an American Egyptologist, born in Devonshire, England, in 1809, died in Panama, Nov. 16, 1857. He went at an early age to Alexandria, where his father was a merchant and also United States consul. He resided in Egypt 23 years, and was during part of the time United States vice consul at Cairo. After leaving Egypt he came to the United States, and lectured at Boston, New York, and Philadelphia, on Egyptian antiquities. At the time of his death he was agent for the Honduras inter-oceanic railway company. He was the author of "Appeal to the Antiquaries of Europe on the Destruction of the Monuments of Egypt" (1841); "Discourses on Egyptian Archaeology" (London, 1841); "Otiæ Ægyptiacæ" (1849); "Ancient Egypt" (4to, London and Philadelphia, 1850; new ed., 8vo, London, 1853); "Types of Mankind," written in conjunction with Dr. J. C. Nott and others (Philadelphia, 1854); "Indigenous Races of the Earth," also with Dr. Nott and others (Philadelphia, 1857); and an essay on the production of cotton in the valley of the Nile.

GLOBE, Artificial, a hollow sphere, on the surface of which is delineated a map of the earth or heavens, with the various circles to which points are referred to determine their positions. Globes are thus of two sorts, terrestrial and celestial. They serve as models to impart correct ideas of the form and movements of the earth and of the heavenly bodies, of their position in relation to each other at different times, of the relative positions of places upon the earth, and of the principle of designating these by lines of latitude and longitude. Globes are also applied to the mechanical solution of various astronomical problems, as the difference of time in different places, dependent on the position of the sun in relation to those places, the times of the rising and setting of the sun at any place, and many other similar questions,

which may be approximately determined without recourse to mathematical calculations. But it is chiefly for the sake of the clear instruction in general geography, which many persons fail to derive from maps, that globes are especially valuable. It is not known when they were first constructed; but the first celestial globe is supposed to have been made by Anaximander of Miletus, a pupil of Thales, who flourished in the 6th century B. C. Ptolemy made use of a terrestrial globe provided with the universal meridian, such as is applied to those now in use. Martin Behaim, the navigator, constructed a terrestrial globe at Nuremberg toward the close of the 15th century. Tycho Brahe had one of copper nearly 5 ft. in diameter. Another was made in Venice in 1683 for Louis XIV., 12 ft. in diameter. Another, 11 ft. in diameter, constructed by Brousch of Limburg, attracted the attention of Peter the Great, who purchased it and removed it to St. Petersburg. It was large enough to accommodate 12 persons sitting around a table within it. Its inner surface was celestial, the stars being represented by gilded nails; and the outer surface was terrestrial. The national library of Paris has two globes of over 14 ft. diameter. A magnificent copper globe made for Louis XVI. is in the Mazarin library; and another of the same material and of admirable workmanship, designed by Poirson for the instruction of the king of Rome, and bought by Louis XVIII. for 36,000 francs, belongs to the museum of the Louvre. In 1851 a large globe of novel construction was built in Leicester square, London, by Mr. Wyld. It was 56 ft. in diameter, and the delineations were upon the inside only. These were modelled in slabs of plaster of Paris, which were set like a ceiling on the ribs of zinc which formed the framework of the structure. The slabs were cast in clay moulds, which were prepared with care from the most correct maps on a scale of 10 miles to the inch. About 6,000 slabs were required to cover the whole surface, their dimensions varying from two feet square as the width diminished toward the poles. The topographical features were represented in relief, and the surface painted in colors. A stairway wound around from the base, by which the circular platforms one above another were reached that brought the spectators near to the inner surface of the great shell.—The globes used by geographers in the middle of the last century were very similar to those now in use. Much attention was directed to their manufacture, and a treatise on their construction and use was published in 1769 by George Adams. The first requisite is a ball to receive the printed map; this is therefore first accurately measured, and due allowance is made for the shrinking each segment will experience after being wet. The diameter being determined, a silver-steel semicircle $1\frac{1}{2}$ in. wide and $\frac{1}{4}$ in. thick is next made, of precisely half this diameter less that of the wires intended for the poles. A globe of wood is now made three eighths of an inch

less in diameter than the steel circle. Into two opposite points of this so-called mould bits of No. 7 wire are inserted for poles. Dry paper is laid all over it to prevent the pasted paper to be next laid from adhering. This is of coarse heavy quality, and eight or ten layers saturated with paste are applied in succession as evenly as possible, covering the whole surface. As this coating becomes dry, it shrinks and fits tightly over the mould. It is then hung by the poles in the front edge of a bench fitted to receive it, and by applying a knife on the line of the equator while the ball is made to revolve, the shell is cut through, so that it may be taken off the mould in two hemispheres. This being done, a turned stick of right length, with a short wire in each end for poles, is introduced, one end in each hemisphere, and the two shells being brought together are secured by glueing their edges. The ball, called in its present state the foundation, is placed in the steel semicircle, and coated with a composition of glue and whiting. Being made to revolve, the excess of the composition is removed by the circle, and the ball is thus turned smooth and true, after which it is carefully dried. The next process is to lay out the lines of latitude and longitude, which is done by a beam compass, commencing with the colures and ecliptic. The first meridian is usually made to pass through the intersections of the equator and ecliptic, the points of the vernal and autumnal equinoxes; and from the former of these points the reckoning of the degrees on the equator and ecliptic begins. The maps are now to be cut on the engraved meridians of each 15° , thus making 24 segments; and these are pasted in succession with white paste upon the foundation, the lines drawn upon it serving as guides. The fitting requires great care, that the edges may be made to exactly coincide, and some stretching of the equatorial portions is sometimes requisite. When dry the paper covering is colored, and then sized with gelatine and immediately varnished. The final process before mounting is to dry again at 200° F. Holtzapfel says: "A globe is usually covered with 26 pieces of paper, namely, 2 pole papers or circles, including 30° around each pole, and 24 gores meeting at the equator. Sometimes the gores extend from the pole to the equator; every gore has then a narrow curved central notch extending 30° from the equator." The globe is hung for support by its poles in a brass circle, which goes round it and is called the universal meridian, inasmuch as any point upon the surface of the globe revolving in this may be brought under it. It is divided into degrees, which on one side are reckoned from either pole toward the equator for the purpose of giving the elevation of the poles, and on the other from the equator toward either pole, to be used for finding the latitude of places. A frame or stand is prepared to receive the globe with its brass circle, the top presenting a broad horizontal circle with two vertical slots placed

opposite each other for receiving the brass meridian, which when adjusted is free to slide around in its own plane, so that the poles may be upright, horizontal, or at any angle to the horizontal circle. Around this circle, which represents the rational horizon or imaginary plane passing through the centre of the earth, are drawn several concentric circles; the innermost represents the horizon, and the slots for the brass circle are on the N. and S. points; the degrees on the northern two quadrants are reckoned from E. and W. toward the N., and those on the southern toward the S. Outside of this is the circle representing the calendar, with the names of the months and divisions corresponding to the days. The next circle contains the signs and degrees of the ecliptic, so arranged that against each day of the year is found the point of the ecliptic in which the sun is situated. In some globes the horizontal circle is made to revolve. It is attached to arms which extend below the brass meridian and unite, supporting the adjusting clamp which supports the brass meridian. A taper pin extends down three inches from the lowest part of the arms, and fits into a socket in the iron base, thus securing by the revolutions of the meridian and horizon in their own planes the effect of a universal joint, so that any part of the globe can be brought under observation without changing the position of the base. To the N. pole of the globe is attached a small circle of brass, called the hour circle, the pole passing through its centre, and holding it so that the two move round together, but yet permitting the hour circle to be moved round by the hand upon the axis. The circle is divided into 24 equal parts, corresponding to the hours of the day, and any one of these can be placed upon any meridian by turning the circle. The quadrant of altitude is a brass slip equal in length to a quarter of the circumference, and divided into 90°. It is fastened to the brass meridian, and is used for measuring degrees in any direction on the globe. A mariner's compass is sometimes attached to the frame of the globe for the purpose of placing the meridian in a N. and S. line. The various circles connected with the terrestrial globe are equally appropriate to the celestial; and as the latter are ordinarily constructed, the observer is supposed to be looking down upon the heavens presenting a convex surface, upon which the stars and constellations are mapped in their proper relative positions. To render the nature of the imaginary circles to which the points upon both globes are referred more clear for the student, the armillary sphere was contrived, which consists of the several circles in the form of graduated brass rings placed in their appropriate positions, and containing in the centre a small globe representing the earth. These circles are the horizon, meridian, equator, ecliptic, equinoctial colure, and the solstitial colure. The sphere formed by them is supported in a frame in the same manner as the

globes.—Celestial and terrestrial globes are sometimes combined, the latter being enclosed in a glass sphere marked with the constellations. Globes are sometimes made also of India rubber or thin paper, and so contrived that they may be inflated with air. Some terrestrial globes contain, in addition to the usual geographical delineations, geological strata, atmospheric currents, isothermal lines, hydrographic information, and trade routes; and in some the land is represented in relief. Slate globes for school use are made with only the lines of latitude and longitude drawn on them; and wooden globes, painted black and similarly marked, are constructed, on which maps are drawn with chalk.

GLOBE FISIL. See SEA PORCUPINE.

GLOBIGERINA, a microscopic protozoan animal, of the foraminiferous order of the class of rhizopods. The body is composed of simple sarcode or protoplasmic matter, enclosed in a shell pierced by numerous minute openings, through which a film of the animal substance is exuded, capable of throwing out small thread-like processes, or *pseudopodia*. The animals increase by budding, each sarcode mass being enveloped in its calcareous shell, but connected irregularly with all the rest of the colony; there is no definite shape, the mass being compared by Huxley to that of a badly grown raspberry. Recent deep-sea dredgings (in the Gulf stream at a depth of 3,100 ft., near the Faroe islands at a depth of 3,900 ft., off Cape Farewell, Greenland, at 7,560 ft., and between the Azores and Newfoundland at 10,000 ft., and in the north Atlantic at still greater depths in the track of the Atlantic cable) have brought up the shells of living globigerinæ from the calcareous ooze of the ocean bottom. In the compound protoplasmic animal to which the name of *bathyporus* has been given, are found globigerinæ, with coccoliths and coccospheres; the ancient chalk deposits are made up almost entirely, in many specimens, of remains of the three last named animals, the same as those now living on the bottom of the ocean; the great central plain of the North Atlantic, 1,000 m. wide and many hundreds in length, nearly level, is covered with a chalky mud containing innumerable globigerinæ with their attendant coccoliths and coccospheres, and the deeper the sea the larger are these animals. They doubtless constitute the food of the star fishes, which also have been dredged from these great depths. There is no reason to think that the habits and the habitats of the ancient chalk animals were different from those of the living globigerinæ; hence we may conclude that the chalk formation, constituting a large part of southern Great Britain and central and southern Europe, often 1,000 ft. thick, is the dried and elevated mud of an ancient deep sea. From the fact that this present deep-sea fauna is apparently identical with that



Globigerina
bulloides.

of the ancient chalk, there seems to be some ground for the statement that the cretaceous period at the bottom of the sea has extended to the present time. For very interesting suggestions concerning the geology and antiquity involved in the study of these animals, the reader is referred to a lecture by Prof. Huxley "On a Piece of Chalk," delivered in 1868, and published in "Lay Sermons and Addresses" (New York, 1871). (See BATHYBIUS, COCCOLITHS, and FORAMINIFERA.)

GLOGAU, or *Gross-Glogau*, a town of Prussian Silesia, on the left bank of the Oder, 54 m. N. W. of Breslau; pop. in 1871, 18,265. It is strongly fortified, and contains an old castle, four churches, a Protestant and a Roman Catholic gymnasium, extensive barracks, and several hospitals. It is connected by a bridge with an island in the Oder, on which stand the cathedral and a strong fortress, built in 1260. The town has manufactories of cotton, woolen, and linen goods, sealing wax, and tobacco. A principality of Glogau was founded in 1252 by the third son of Duke Henry II. of Silesia. In the following century it was made a duchy, which became extinct in 1506. The town was burned in 1420 and in 1615.

GLOMMEN, the largest river of Norway, rising in the mountains of the S. E. part of the province of Drontheim, near lat. 63° N., and flowing for the most part nearly due S. through several lakes, into the Skager Rack. Its length is about 360 m. The entire valley through which it flows is remarkable for picturesque scenery, cataracts, and forests of pine, producing the finest timber in Europe. From the town of Røraas to the Ojeren lake, the river is a mountain torrent. The head of navigation is at Sarpborg, about 10 m. from the mouth. The Glommen has more than 20 cataracts, the principal one being the celebrated Sarpfoss, half a mile above Sarpborg. The river, a short distance above, is divided into two branches, which flow in parallel directions to the sea. The E. branch, having forced its way through a rugged defile, reaches the brink of a precipice, where, although divided at the summit by a projecting cliff, it falls an unbroken cascade, about 75 ft. The abyss is strewn with large masses of granite, which break the volume of water into vast sheets of foam. On the brink of the fall the stream is about 120 ft. wide, and from 26 to 30 ft. deep, according to the season. The rapids, for a short distance inward, are remarkably fine.

GLORY PEA, a name given by Australians to plants of the genus *clianthus*, of the order *leguminosæ*, especially to the species named, in honor of the navigator Dampier, *C. Dampieri*. This is found in the desert regions of Australia as a low straggling shrub with light-colored, hairy, pinnate leaves. The flowers are borne in clusters from the axils of the leaves, and are very singular in form and brilliant in color; the standard or banner petal of the flower appears in the form of an elongated shield of

the most intense scarlet color, with a boss in the centre of so dark a brown as to appear black. For many years this had been regarded as one of the most difficult to raise of all greenhouse plants, it being very impatient of any disturbance of the root, and being subject



Glory Pea (*Clianthus Dampieri*).

to the attacks of insects, but it was finally discovered that it would succeed well by sowing the seeds in the open border. They should be sown after the soil is well warmed by the sun, in the place where the plants are intended to remain.

GLOSSOP, a town of Derbyshire, England, 19 m. N. W. of Sheffield; pop. in 1871, 5,074, and of the borough, 17,046. It consists of an old and a new town, the former better built than the latter, and contains a fine parish church, chapels for Roman Catholics and dissenters, a town hall, and various charitable institutions. It is the chief cotton manufacturing place in the county, having more than 50 cotton mills in the town and its neighborhood, besides woollen and paper mills, bleach fields, dye and print works, and iron foundries. On a hill near the town is Melandra castle, the site of a Roman station, and a Roman road known as the doctors' gate extends from the castle to Brough.

GLOUCESTER. I. A S. W. county of New Jersey, separated by the Delaware river from Pennsylvania on the N. W., drained by Big Timber, Oldman's, Raccoon, and Mantua creeks; area, 280 sq. m.; pop. in 1870, 21,562. The surface is generally level and much of it covered with forests. The soil along the banks of the Delaware and for about 7 m. inland consists of a clayey loam, productive and well cultivated. Marl is found here, and iron ore is obtained near Woodbury. The S. E. part of the county is sandy and mostly unimproved. It is traversed by the West Jersey and the Swedesboro railroad. The chief productions

in 1870 were 123,181 bushels of wheat, 20,334 of rye, 457,236 of Indian corn, 27,543 of oats, 762,624 of sweet and 411,872 of Irish potatoes, 334,674 lbs. of butter, and 27,805 tons of hay. There were 4,574 horses, 5,523 milch cows, 2,415 other cattle, 2,704 sheep, and 10,382 swine; 3 manufactories of agricultural implements, 2 of boots and shoes, 10 of carriages, 5 of collins, 2 of glass ware, 2 of window glass, 7 of saddlery and harness, 3 of tin, copper, and sheet-iron ware, 13 flour and 6 saw mills. Capital, Woodbury. **II.** A S. E. county of Virginia, bordering on Chesapeake bay, bounded N. by the Piankatank and S. W. by York river; area, 280 sq. m.; pop. in 1870, 10,211, of whom 5,429 were colored. The surface is level and the soil light and productive. Among the most important exports are oysters and fish, the taking of which employs large numbers of the inhabitants, and wood, which is sent to New York and Philadelphia. The chief productions in 1870 were 21,966 bushels of wheat, 207,240 of Indian corn, 25,856 of oats, 10,673 of Irish and 9,110 of sweet potatoes. There were 808 horses, 1,707 milch cows, 3,130 other cattle, and 8,274 swine. There were 6 saw mills. Capital, Gloucester Court House.

GLOUCESTER, a N. E. county of New Brunswick, Canada, bounded N. by the bay of Chaleurs, E. by the gulf of St. Lawrence, and drained by Nipisiguit and other rivers; area, 1,684 sq. m.; pop. in 1871, 18,810, of whom 12,680 were of French, 3,695 of Irish, 1,215 of Scotch, and 932 of English origin. The surface inland is diversified by hills, between which lie fertile valleys. The climate is favorable for agriculture, while the great extent of coast, off which are several islands, and the number of good harbors, afford opportunities for fishing and lumbering. Ship building is actively carried on. Capital, Bathurst.

GLOUCESTER, a city and port of entry of Essex co., Massachusetts, on the peninsula of Cape Ann, 30 m. N. N. E. of Boston, with which it is connected by a branch of the Eastern railroad. It formerly comprised the whole of Cape Ann, and was 8 m. long by 5 broad; but in 1840 the N. E. portion of the peninsula was formed into the town of Rockport. The city contains six distinct villages, each having a post office, viz.: East Gloucester; Annisquam, or Squam, on the N. side of the cape, which has a safe harbor much resorted to by fishing vessels; Bay View and Lanesville, noted for their fine granite quarries; West Gloucester, formerly known as West Parish, which has a beach 2 or 3 m. long, of white sand, of which large quantities are exported; and lastly, Gloucester village, or "The Harbor," on the S. side, which has one of the best ports on the coast, capacious, safe, easy of access, and with sufficient depth of water to admit the largest vessels. The harbor is formed by a peninsula, known as Eastern point, jutting out from the main body of Cape Ann in a

S. W. direction, and opens into Massachusetts bay. On the extremity of the point is a fort mounting 10 guns. Gloucester was a place of importance prior to 1800. It increased slowly until 1850, since which its growth has been rapid. The population in 1790 was 4,912; in 1800, 5,313; in 1810, 5,901; in 1820, 6,384; in 1830, 7,513; in 1840, 6,350; in 1850, 7,786; in 1860, 10,904; in 1870, 15,389, of whom 4,007 were foreigners. The principal portion of the city, in the vicinity of the harbor, is handsomely and compactly built, and very beautifully situated, with extensive and picturesque sea views, and is a fashionable summer resort for bathing and sea air. The city hall is an elegant brick building, erected in 1870 at a cost of \$115,000, and two of the school houses are large and handsome structures. Gloucester is mainly noted for its cod and mackerel fisheries, far surpassing any other port in the country in the number of vessels and men employed, and in the value of the catch. In 1865 the number of vessels engaged was 341, having an aggregate tonnage of 24,450, and employing 4,590 men; capital invested, \$1,865,700; mackerel caught, 154,938 barrels, valued at \$2,190,562; cod and other dry fish, 113,028 quintals, worth \$706,425; value of cod-liver oil sold, \$90,420. The value of all fishery products was \$3,319,457. In 1873 the catch, with the value of each item, was as follows: codfish, 460,000 quintals, \$2,070,000; other fish, 25,000 quintals, \$50,000; fresh fish, including halibut, 9,000,000 lbs., \$310,000; oil, 275,000 gallons, \$165,000; mackerel, 86,544 barrels, \$1,125,000; herring, 5,000 barrels, \$23,000; shell fish, 18,000 barrels, \$18,000; miscellaneous, \$40,000; total value, \$3,800,000. The number of vessels belonging to Gloucester engaged in fishing in 1873 was 375, with about 3,500 men, of whom but a small proportion are residents of the city. The business is attended with great risk, 236 vessels and 1,200 lives having been lost since 1830. The losses in 1873, the heaviest experienced in any year, comprised 31 vessels and 174 lives. The customs district includes the adjoining towns of Essex, Manchester, and Rockport. The value of foreign commerce for the year ending June 30, 1873, was: exports, \$1,512; imports, \$60,735. The number of vessels cleared was 127, of 13,365 tons; entered, 117, of 17,771 tons. In the coastwise trade the entrances were 131, with an aggregate tonnage of 9,807; clearances, 54, of 7,977 tons. On June 30, 1872, there were 524 vessels, of 27,537 tons, belonging to the district; engaged in the cod and mackerel fishery, 448, of 22,174 tons, of which 41, of 497 tons, were each less than 20 tons; built during the year, 13 vessels of 823 tons. The tonnage of the district on June 30, 1873, was 28,565; number of vessels (nearly all schooners), 517, of which 420 were employed in fishing, 90 in the coasting trade, 6 in foreign commerce, and 1 in yachting. A line of steamers from Glou-

cester runs daily to Boston. The manufactures are almost exclusively confined to articles pertaining to the fisheries, embracing anchors, ice crushers, bait mills, ships' blocks, masts and spars, boats, leads, fish guano, &c. There are six marine railways and 70 wharves. The extensive granite quarries on the N. side of the cape furnish stone which is mostly used for paving, but a considerable quantity is also prepared for other purposes. The new post office in Boston is built of Gloucester granite, and the base of the Scott monument in Washington, an immense block weighing nearly 100 tons, is of the same material. The city contains three national banks, with an aggregate capital of \$570,000, and three marine insurance companies. It is divided into eight wards, and is governed by a mayor, a board of aldermen of 8, and a common council of 24 members. There is a police court, an efficient police force, and a well organized fire department. The assessed value of property in 1873 was \$7,714,520; taxation, \$161,352; debt, \$218,000; value of property belonging to the city, \$330,785. It is lighted with gas. The principal charitable associations are the Gloucester fishermen's and seamen's widows' and orphans' aid society and the ladies' charitable society. There are 24 public schools, viz.: 1 high, 7 grammar, 12 primary, and 4 ungraded, attended by about 3,000 pupils, and supported at an annual cost of about \$40,000. Two weekly newspapers are published. The Sawyer free library contains about 4,000 volumes. The number of churches is 12, viz.: 2 Baptist, 2 Congregational, 1 Episcopal, 3 Methodist, 1 Roman Catholic, 1 Unitarian, and 2 Universalist. Besides these, there is a society of Swedenborgians who do not possess a church edifice.—The Indian name of Gloucester was Wingaersheek. It was occupied as a fishing station in 1624, being the first place settled by the English on the N. side of Massachusetts bay. In 1642 it was incorporated as a town under its present name, some of the principal inhabitants having come from Gloucester, England. The first schooner ever constructed was built here in 1713 by Capt. Andrew Robinson. The British sloop of war Falcon, Capt. Lindsay, assailed the town Aug. 8, 1775, bombarded it for several hours, and attempted to cut out some vessels in the harbor, but was driven off by the inhabitants. In

the second war with Great Britain, Sept. 8, 1814, Gloucester was attacked by the British frigate Tenedos, which, however, did no serious damage. In both of these wars the town sent out swarms of privateers, and contributed largely to the manning of the navy. It became a city in January, 1874.

GLOUCESTER, a city and municipal and parliamentary borough of England, one of the county towns of Gloucestershire, on the left bank of the Severn, 95 m. W. by N. of London; pop. in 1871, 18,330. The chief public edifice is the cathedral, originally the church of a Benedictine abbey. It was built and added to at various periods from the 11th to the 15th century, and is one of the most celebrated English cathedrals. It is remarkable for the perfection of the styles of architecture which indicate



Gloucester Cathedral, from the Southeast.

the different periods of erection and addition, and the choir is considered one of the finest examples of florid Gothic in the world. It contains many monuments, among others those of Robert, son of William the Conqueror, Edward II., Bishop Warburton, and Dr. Edward Jenner. The city also has several handsome parish churches, a college, blue-coat and free grammar schools, the county hall, hospitals, &c. The handsomest portion of the town is at the S. end, around a spring of saline chalybeate water discovered in 1814. The staple manufactures are pins, hardware, gloves, saddles, canvas, cutlery, ropes, and soap; and some ship building is carried on. A bell foundry was established prior to 1500, but it has recently been removed. Since the completion in 1827 of the Berkeley ship canal, by which vessels of 500 tons burden can come up to the city, the commercial importance of Gloucester has greatly

increased. The city is probably of British origin. It became a Roman station under the name of Colonia Glevum, and under Claudius received the name of Claudia Castra. The Saxons called it Gleau-ceaster, and it flourished during the heptarchy. In the 17th century it was strongly fortified, and took a conspicuous part against the royalists. The bishopric of Gloucester was instituted by Henry VIII., and was joined to Bristol in 1836.

GLOUCESTERSHIRE, a S. W. county of England, bordering on Worcestershire, Warwickshire, Oxfordshire, Berkshire, Wiltshire, Somersetshire, Monmouthshire, and Herefordshire; area, 1,258 sq. m.; pop. in 1871, 534,320. It is traversed from N. E. to S. W. by the Cotswold hills, which separate the basin of the Severn from that of the Thames. The district between these hills and the Severn comprises the vales of Evesham (principally in Worcester-shire), Gloucester, and Berkeley, of surpassing beauty and richness. Beyond the Severn the greater part of the county is under forest, more than 20,000 acres of which still belong to the crown; it is called the forest of Dean, and was once the principal source of supply of timber for the English navy. The chief rivers are the Severn, Wye, Lower Avon, Frome, Thames, Colne, and Windrush. This county, having extensive and exceedingly rich natural pastures, has long been famous for its butter and cheese. The celebrated double and single Gloucester cheese is principally produced in the Berkeley vale. Large numbers of sheep are reared on the Cotswold hills and in the forest region, the latter being also noted for its orchards and the excellence of its cider and perry. Coal exists in great abundance; lead, sulphuret of iron, oxide of zinc, limestone, coral, quartz crystals, celebrated as Bristol diamonds, and gypsum, are also found. The manufactures are woollens, cottons, silks, hosiery, hats, tick, hardware, glass, paper, and carpets. Capitals, Gloucester and Bristol; other chief towns, Cheltenham, Cirencester, Stroud, and Tewkesbury.

GLOVE, a covering for the hand (sometimes extending up the arm), with a separate sheath for each finger. Gloves are spoken of by Homer as worn by Laertes to protect his hands while working in the garden. Xenophon speaks of Cyrus going without his gloves. The custom of giving a glove as a pledge in concluding a contract is very ancient, and from this is supposed to have been derived the later custom of throwing down a glove as a challenge, which the opposite party accepted by picking up the glove and throwing down his own. This is traced in England as far back as the year 1245. In the middle ages gloves were an object of special regard; they were made in the most costly manner, ornamented with precious stones, and worn by kings and church dignitaries on ceremonial occasions. A glove was used in the ceremony of bestowing lands and dignities, and deprivation of gloves was a sign of degradation. It was her glove which the

lady gave her faithful knight to wear in his helmet as a pledge of her favor. Down to the present time curious ceremonies have been associated with gloves, as the custom in some parts of Europe of taking them off when entering the stable of a prince or a great man, or else forfeiting them or their value to the servants. In hunting, the same ceremony must be performed under the same penalty at the death of the stag. Glove money is a term of ancient use, meaning money given to servants to buy gloves. Embroidered gloves were first made in England in 1580, and the custom of presenting them to judges at maiden assizes is still continued. Presenting a pair of gloves for any favor rendered is a very old custom.—Gloves are made of a variety of materials. In cold regions they are of the warmest wool, or of the skins of animals with the fur on the outside. Thick buckskin, often lined with soft woollen, is also used, but in more moderate climates lighter qualities of leather, to the softest kid, are employed, and also worsted, cotton, and silk. The preparations of caoutchouc are applied to the same purpose, chiefly for the protection of ladies' hands in rough work, such as gardening. The art of glove making is carried to its highest perfection in the manufacture of kid gloves by the French, being one of the most important industries of the country. The English, who make excellent gloves of heavier varieties of leather, largely import the best Parisian gloves. Woodstock and Worcester are celebrated for their fine leather glove manufactories, and kid and other gloves are also extensively made in London, Yeoville, Ludlow, and Leominster, generally, for the best qualities, of skins imported from France and Italy. Most of the cheaper kinds of so-called kid gloves are made from lamb, rat, and other thin skins. Sheepskin gloves, generally white, are made for the army. In 1871 England began to import opossum skins from Australia for glove making. Many first-class real kid gloves are manufactured in London, but they are generally sold as French. Great skill is required for the cutting of the skins to the best advantage; this process is performed with a pair of scissors after stretching and rubbing the skin upon a marble slab with a blunt knife. A skin is first cut longitudinally through the middle, and the single strip for the palm and back is next cut off from one end of the half skin. The pieces for the thumb, the gussets for the fingers, and other small pieces to be inserted, must all be worked out either from the same skin or from others precisely similar. The nearly square piece cut off is folded over upon itself, giving a little more width for the side designed for the back of the hand; and upon this oblong double strip the workman, measuring with his eye and finger, marks out the length for the clefts between the fingers, which he proceeds to cut and shape. Making the hole for the thumb requires the greatest skill, for a very slight deviation from

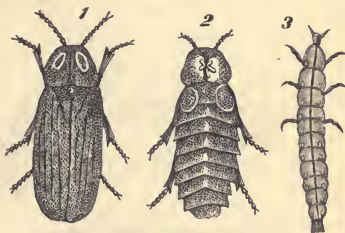
the exact shape would cause a bad fit when the parts are sewed together, resulting in unequal strain and speedy fracture. By improvements introduced by M. Jouvin, the thumb piece, like the fingers, is of the same piece with the rest of the glove, requiring no seam for its attachment. The cutting also is performed in great part by punches of appropriate patterns, and some of these are provided with a toothed apparatus somewhat resembling a comb, which pricks the points for the stitches. The seams are sewed with perfect regularity by placing the edges to be united in the jaws of a vice, which terminate in fine brass teeth like those of a comb, but only $\frac{1}{2}$ of an inch long. Between these the needle is passed in successive stitches. When the sewing is completed the gloves are stretched, then placed in linen cloth, slightly damp, and beaten, by which they are rendered softer and more flexible. The last operation is pressing. In 1866, while England exported 680,664 pairs of leather gloves of British make, it imported 10,619,220 pairs, of which 10,036,092 were from France. In the same year England exported 315,180 pairs of cotton gloves, chiefly to the United States. But in 1868 Germany was not only competing with England in leather gloves in the London market, but it sent three fourths of the cotton and Lisle thread gloves sold in England, and for export had secured nearly the entire trade of the United States, which had formerly bought this class of goods in Nottingham and Leicester. In 1868 the value of gloves made in France was estimated at 50,000,000 francs, and the manufacture was increasing.—The chief branch of the manufacture carried on in the United States is that of buckskin gloves, a kind more peculiarly American than any other; and the most important seat of this business is at Gloversville, Fulton co., N. Y. Kid gloves are now made to some extent there and in New York.

GLOVER, Richard, an English poet and politician, born in London in 1712, died there, Nov. 25, 1785. He was educated for a mercantile life, but early manifested a love of letters, and at the age of 16 wrote a poem to the memory of Sir Isaac Newton. In 1737 he published an epic on the Persian invasion of Greece, entitled "Leonidas," which was thought to have an application to English politics, and was for a time much admired. A continuation of it, under the title of the "Atheniad," appeared in 1787. His "London, or the Progress of Commerce," and a ballad called "Hosier's Ghost" (1739), were written to rouse his countrymen to a war with Spain. He was active in politics as an opponent of Walpole, and was returned to parliament for Weymouth in 1760. He wrote several tragedies, and a diary which was published in 1813, and in the following year appeared an "Inquiry" attempting to prove that he was the author of the letters of Junius.

GLOWERSVILLE, a village in the town of Johnstown, Fulton co., New York, 40 m. N. W. of Albany, at the terminus of the Fonda, Johns-

town, and Gloversville railroad, which connects with the New York Central at Fonda, 7 m. distant; pop. in 1870, 4,518. It is chiefly noted for its extensive manufactures of gloves and mittens. The business was commenced in 1803, and the village now contains about 140 establishments, manufacturing two thirds of the kid and buckskin gloves and mittens made in the United States. There are also manufactories of machine and glove patterns, organs, railroad lamps, carriages, kid and other leather, a planing mill, two national banks, three weekly newspapers, and seven churches.

GLOWWORM, a name given to several sericorn beetles, constituting the genus *lampyrus* (Fab.). The antennæ are short, with cylindrical and compressed articulations; the head is concealed beneath the anterior margin of the thorax; the eyes and the mouth are small; the body is rather soft and depressed, with the sides of the abdomen serrated; the elytra are coriaceous and slightly flexible. The females are wingless, with rudiments of elytra at the base of the abdomen, and their general appearance to the uneducated eye is that of a worm, explaining fully the popular name of glow-



Glowworm (*Lampyrus splendidula*).

1. Male. 2. Female. 3. Larva of *L. noctiluca*.

worm in England, and *ver luisant* in France. In the old Linnæan genus *lampyrus* there were as many as 60 species, which have been distributed into different genera, so that there were only nine species left in the genus in the last edition of Dejean's catalogue. There are four well known species of glowworm in Europe, *L. noctiluca*, *Italica*, *splendidula*, and *hemiptera*; the second is probably the species whose luminous faculty was known to the ancients, the *λαμπροψ* of the Greeks, and *ciendela* of the Romans. Both sexes are luminous, though the light is stronger in the female; the light does not come from the thorax as in the firefly (*elater*), but from the posterior part of the abdomen on its upper and under surfaces. The English glowworm (*L. noctiluca*, Linn.) is the largest European species, about two thirds of an inch long in the male, and the female about an inch; the male is brownish gray, with a reddish gray margin on the superior portion of the thorax, and has both wings and elytra; the female is wingless, of a uniform yellow white, with a very thin skin below; in both sexes the luminous spots show themselves as

four bright points, two on the antepenultimate abdominal segment, and two on the next posterior. The *L. Italica* is next in size, and is found in southern Europe, as the first is in the northern countries; the color is black, with red prothorax and legs; both sexes are winged, and much resemble each other, the apterous females spoken of by some entomologists being the larvæ. The *L. splendidula* is common in Germany; the male is winged, brown gray, with a bright glassy spot on the convex margin of the prothorax; the female, whitish yellow with a brown spot on the centre of the prothorax, has no wings, and very short oval elytra; the luminous spots are two transverse bands on the lower surface of the two penultimate abdominal segments, and in the female the whole abdomen diffuses a weak light. *L. hemiptera*, a southern species, and the smallest one third of an inch long, is opaque black, lighter in the female, the posterior ventral plates being whitish; the males have truncated elytra, the females none; the light is diffused from two round spots on the penultimate segment; the larvæ are probably luminous, as those of the preceding species were found to be by Burmeister. The first three species conceal



Glowworm (*Lampyris noctiluca*).

themselves in the daytime and appear at night, the males flying about in the warm summer evenings, while the females betray their situations by their tranquil light among the shrubs; the last species creeps also by day, especially in damp weather, appearing toward the end of April; the third species occurs about the end of May and the beginning of June, while the first is found most abundantly toward the end of summer. The light is greenish or more commonly bluish white, intermittent or continuous at the will of the insect, extinguished in time of danger, and increased by active motion, sexual excitement, or artificial heat; it may continue some hours after death, and when lost may be reproduced by warm water; poisonous gases destroy the light with life, while oxygen increases its brilliancy; electricity produces no effect on the light, while galvanism increases or reproduces it in dead insects. The researches of Kolliker and others show that at the shining spots is a whitish, transparent, fatty mass, permeated by very numerous tracheæ; this mass will shine when removed from the body, and in warm water for a long time, and its particles rubbed upon the fingers display a light

resembling that from phosphorized mixtures. The eggs of the glowworm, the larvæ, and the nymphs, are luminous; the eggs are hatched after a few weeks, and the larvæ resemble the perfect females, having a body of twelve segments, the first three of which bear each a pair of feet; the head is small, and, like the caudal segments, retractile; they thrive well in captivity when kept in moist earth or herbage, and supplied with slugs and snails, which they kill with their arched and sharp-pointed jaws, and eagerly devour; about a week is occupied in assuming the state of nymph, and in about eight days longer they appear as perfect insects. The nymph is larger than the larva, but not quite so long; the color is at first pale yellow, with two reddish spots on the posterior part of the thorax and the segments, but the dull color of the perfect insect is visible toward the end of the nymph state; the larval jaws disappear, and the antennæ are seen to have eleven joints, and the tarsi five; the last abdominal rings are very brilliant, and indeed the whole body seems phosphorescent. According to Dufour, the alimentary canal of the perfect female is twice as long as the body, and the œsophagus exceedingly short, immediately dilating into a short crop.—The substance from which the luminous property is derived has been often made the subject of experiment, but as yet, according to Matteucci, without the detection of any phosphorus in it, though the circumstances attending the light resemble the conditions under which phosphorus is luminous, being increased by warmth, diminished by cold, and destroyed by irrespirable gases, oil, alcohol, acids, and strong saline solutions; these phenomena admit of a better explanation on Matteucci's theory. This author, in his *Leçons sur les phénomènes physiques des corps vivants*, explains all cases of animal phosphorescence on physico-chemical principles. From his experiments we know that the light of the glowworm may cease before the death of the animal, or may be considerably prolonged after this event; that the light is without heat, as far as our rude instruments can detect; that it ceases soonest in carbonic acid, and in hydrogen in from 30 to 40 minutes; that it is increased in oxygen, and lasts three times as long as in other gases, both for parts and for the entire insect; that it consumes a portion of oxygen, which is replaced by carbonic acid, and is therefore the product of a true combustion; that when not shining, and in contact with oxygen, none of this gas is taken up, and no carbonic acid is formed; that heat to a certain extent increases, while cold diminishes its brightness; that when the luminous substance has been altered by too great heat or the action of gases so as to lose its phosphorescence, this property cannot be reestablished; finally, that carbon and not phosphorus is one of the elements of this substance, and that the phosphorescence is produced by the combination of the carbon with the oxygen. The luminous matter from the living insect,

according to the same author, has a peculiar odor resembling that of the perspiration of the feet; it is neither acid nor alkaline, dries rapidly in the air, seems to coagulate in contact with dilute acids, is not sensibly soluble in alcohol, ether, or weak alkaline solutions, but is dissolved in concentrated sulphuric and hydrochloric acids with the aid of heat; chemical tests exclude the idea of the presence of albumen, and the ordinary ammoniacal products are disengaged by heat. The oxygen of the atmosphere introduced by the numerous tracheæ comes in contact with this substance, *sui generis*, composed principally of carbon, hydrogen, oxygen, and nitrogen. The intermittence of the glowworm's light, and its sudden changes from darkness to brightness, as far as present investigations go, are dependent on the different amounts of air introduced into the tracheæ, and the varying activity of respiration and muscular action. The change in the food of the glowworm, from animal juices in the larva state to tender plants in the perfect condition, explains the contradictory statements of authors as to the habits of this insect; and the failure of the attempts to introduce it as an ornament to shrubberies and lawns has generally arisen from ignorance of the fact that the larva cannot be raised on vegetable food alone; besides moist herbage or damp earth, minute land shells must be supplied.—A few specimens of an articulated animal which may be called a glowworm have been found of late years in summer in various parts of southern New England. The head is small and flat, with very short antennæ; the color is cream-white, the length about 14 lines, and the whole of this is lighted up at night with a permanent luminousness less than that of the elaters of the West Indies; the light begins to show itself between the segments, of which there are 12, and at the stigmata, from which it spreads until the whole animal is illuminated, seeming a stick of light without joints or stigmata; most brilliant soon after midnight, they gradually fade to the ordinary whitish color at day-break.—In all these cases of phosphorescent articulates it is difficult to say what is the precise purpose of the light. (See FIREFLY.)

GLUCINA (Gr. γλυκίνη, sweet), an earth, first obtained by Vauquelin in 1798, consisting, according to Berzelius, of two atoms of the metal glucinum, united with three atoms of oxygen; but Awdew and others regard it as a protoxide, GIO. It is found only in a few minerals, as the emerald, beryl, enclase, &c., being contained in the first two in the proportion of 13½ per cent., combined with silicic acid. It is obtained in the form of a white powder, of specific gravity about 3, closely resembling alumina. It is distinguished by its solubility, when freshly prepared in a cold solution of carbonate of ammonia, and by its tendency to form a carbonate by exposure to the air; also by not giving a blue color in the blowpipe test with nitrate of cobalt. The properties of glucinum, the

metallic base of glucina, have been investigated by Debray (*Annales de chimie et de physique* [8], xliv. 5), who obtained it from the chloride by reduction with sodium, the original source being the emerald of Limoges. He found it a white malleable metal, that could be rolled in sheets like gold, of density 2.1, its melting point below that of silver. It cannot be made to burn in pure oxygen, but appears in the trial to be slightly oxidized on the surface, by which it is protected from further change. It resists the action of sulphur, but combines with chlorine and iodine. Its alloy with silicium is a hard brittle substance, susceptible of a high polish. Glucinum is soluble in sulphuric and in hydrochloric acids, hydrogen being evolved. Nitric acid acts upon it only when heated, and then slowly. It dissolves in caustic potash. Its symbol is G; chemical equivalent, 9.2.

GLUCK, Christoph Willibald von, a German composer, born at Weidenwang in the Upper Palatinate, July 2, 1714, died in Vienna, Nov. 15, 1787. The dates and other particulars in this article which differ from those usually given, are drawn from documentary evidence substantiated or first given to the public by Anton Schmid, of the imperial library at Vienna, in 1854 (*Glucks Leben und tonkünstlerisches Wirken*). The father, Alexander Johannes Klukh (as he always wrote his name), was first a huntsman of Prince Eugene, afterward removing to Weidenwang as forester. In 1717 he entered the service of Count Kaunitz in Bohemia, and thus the young Christoph came at the age of three to the land which, owing to its great number of wealthy nobles and convents, was then the most favorable to the development of musical talent. In the gymnasia and the Jesuit colleges music was earnestly cultivated, and every nobleman had his musical chapel; all churches of any pretensions, very many of the smaller parish churches even, had their choirs supported by ample funds. The treatment of Gluck and his brothers by the father was hard even to tyranny; the composer in his old age well remembered being forced with his brother Anton to follow his father in the coldest winter weather into the forests, sometimes barefoot, "to make them tough." The children had the best school instruction in Kamnitz and Eisenberg, and from his 12th to his 18th year Christoph was sent to the gymnasium at Kommotau. The boy carried with him a good degree of knowledge both in singing and playing bowed instruments, and in the school of the Jesuits his musical talents were specially cultivated. He became a chorister in the principal church of the place, and gained some knowledge of the harpsichord and organ. At 18 he went to Prague to enter the university, but was finally obliged to devote himself to music for subsistence. He gave lessons in singing and upon the violoncello, sang and played in several churches for a small salary, and during vacation sang and played in the villages of the surrounding country, sometimes

being paid in one with eggs, which in another he exchanged for bread. After a time he appeared in the large towns as a violoncellist, and attracted the attention of Prince Lobkowitz, so that when in 1736 he went to Vienna, the house of the prince was opened to him, and a salary was given which enabled him, at 22, to study musical science. He now had opportunity also to hear the works of Fux, Caldara, the brothers Conti, Porsile, and other dramatic and church composers, adequately performed. The Lombard prince di Melzi, hearing Gluck both as a singer and violinist, in the soirées of Lobkowitz, appointed him chamber musician, took him to Milan, and placed him under Sammartini. Having meanwhile shown talent in composition, in 1740 he received an order to compose an opera for the court theatre of Milan. The old field of the Italian opera of Handel's time had now been nearly exhausted, and the works of the day, even those of the greatest masters, had gone down in the scale until they were little more than pieces of music written to give the singers opportunity to exhibit their powers. Real musical expression was one of the last things which entered into the thoughts of the composer. Hence the first work of Gluck has an importance in musical history beyond any other of that time, unless the oratorios of Handel be excepted. The text chosen for him was the *Artaserse* of Metastasio, a libretto which in its form was sufficient—in case Gluck had then, which he had not, thought out the system which he afterward adopted and which produced an entire revolution in the musical drama—to prevent him from striking out an entirely new path. Still the composer had an indistinct feeling of the hollowness and insufficiency of the recognized forms of dramatic composition, and ventured to make expression the great object of his music. He completed the work, with the exception of one air, in his own manner, and in 1741 had it in study. At the first rehearsal in the theatre a large company was present. The new work proved so different from what they were accustomed to hear as to be generally received with smiles, and shrugs, and jokes upon the German composer. Gluck let all pass without remark. For the final rehearsal he composed the wanting air in the strictest style of the day. It was a beautiful piece for the singer, and when the audience heard it they broke into the loudest applause, and with one consent attributed it to Sammartini. Gluck remained silent. The first public performance came off with appropriate scenery and action. The house was crowded. The interest rose with every number, the music meeting with the most decided success, until the modish air, which proved so "stale, flat, and unprofitable," so out of character with all the rest, that Gluck had to withdraw it and substitute one more in the spirit of his work. The success was triumphant, and the composer was called from city to city of Italy to direct

the *Artaserse*. He was now the great operatic composer of that era. In 1742 he wrote *Demofoonte*, text by Metastasio, for Milan; *Demetrio* and *Ipernestra*, texts by the same, for Venice; in 1743, *Artamene* for Cremona, and *Siface* for Milan; in 1744, *Fedra* for Milan; in 1745, *Alessandro nell'Indie*, by Metastasio, under the title *Poros*, for Turin. Lord Middlesex invited him to London to compose for the theatre in the Haymarket, and in 1745 he set out for the English capital, but found the theatre closed. On Jan. 7, 1746, it was reopened, with *La caduta de' giganti*, by Gluck. It was not successful, and was only performed five times. He afterward produced *Artamene* with better fortune, and *Piramo e Tisbe*, in which pieces from his earlier works were, at the wish of the managers, adapted to a new text. This failed comparatively; and this event led Gluck to his permanent system of composition, whose principles are as follows: 1, that dramatic music can only reach its highest power and beauty when joined to a text simple, truly poetic, and exhibiting natural and definite emotions and passions with the highest possible truth to nature; 2, that music might be made the language of emotion, capable of expressing the various feelings of the heart; 3, that the music must follow with all possible exactness the rhythm and melody of the words; 4, that in accompaniments the instruments must be used to strengthen the expression of the vocal parts by their peculiar characters, or to heighten the general dramatic effect by employing them in contrast to the voice, as the text or dramatic situation might demand. From these principles it followed that the beautiful arias then esteemed the highest efforts of the musical art, though in fact unsurpassable as means of sensual gratification to the ear, could never deeply touch the soul nor rouse any lasting emotion. In his later years Gluck was in the habit of saying, when an air of this kind was commended: "Yes, it is right beautiful; but it does not draw blood." Toward the close of 1746 the composer returned to Germany. Dlavacz says he became a member of the electoral orchestra of Dresden with a respectable salary, which seems probable, but in fact none of the biographers have cleared up the chronology of his life for the two or three years after his return. On June 29, 1747, an opera in one act, *Le nozze d'Ercole e d'Ebe*, music by Gluck, was performed at Pilitz in honor of the marriage of Princess Anna, daughter of Augustus III. According to Schmid, *La Semiramide riconosciuta*, text by Metastasio, music by Gluck, was performed at Vienna on Maria Theresa's birthday, in May, 1748; and in the autumn of the same year a newspaper contains a paragraph of news from Hamburg, which is dated Oct. 3, and says: "Herr Gluck, so well known in music, is at present chapelmaster here in place of Scalabrini." In 1749 he removed to Vienna, and only left that city when called to Italy and Paris to produce his works. In the

house of Joseph Pergin, a banker and wholesale merchant, he was received both as a friend and as music teacher of the two daughters. With Marianne he fell in love, and his passion was returned. The mother approved the match, but when the young man applied to the father for the hand of his daughter, he was rudely refused, as being but a musician. Wounded by this, Gluck now accepted an order to compose *Telemacco* for the theatre Argentina at Rome, and left Vienna at once, in such haste to be away that, without waiting for his passport, he smuggled himself across the boundary in the habit of a Capuchin monk. In 1750 news came to him that Pergin was dead. As soon as his opera was upon the stage, where, like all his other works, it was successful, he hastened back to Vienna, and on Sept. 15 was married. The marriage was childless, but few have been happier, and seldom even during his most tedious journeys were Gluck and his wife separated. In 1751 he visited Naples, to produce *La clemenza di Tito*; in 1754 he composed *Le Cinesi*, a fantastic production, performed at Schlosshof before the emperor and Maria Theresa; and the same year he was appointed chapelmaster of the imperial opera at Vienna, which office he held until 1764. Before the close of the year he was again called to Rome, and produced there *Il trionfo di Camillo* and *Antigono*, which gained him from the pope the order of knight of the golden spur; hence his title in musical history, Chevalier or Ritter. In 1755 he produced the music to Metastasio's *La danza*; in 1756, *L'innocenza giustificata* in one act, and *Il re pastore* in three. Between 1755 and 1762 he composed also a great number of airs and other pieces for a series of ten French operettas and vaudevilles performed in Vienna. In 1760 his principal work was *Tetide*, a serenata composed for the nuptials of the archduke Joseph; and in 1761 a most successful ballet, *Don Juan*, or *Das steinerne Gastmahl*, founded upon the same fable afterward employed by Da Ponte in his text to Mozart's immortal opera. In 1762 *Il trionfo di Clelia* was composed at Bologna, and met with the invariable success of Gluck's productions, and then its author returned to Vienna. Calzabigi had there ready for him the libretto of *Orfeo ed Euridice*, a poem differing completely in construction from the Metastasian type, which then alone was recognized as classic throughout Europe. Orpheus, Eurydice, and, in two or three short scenes, Amor are the only characters represented. At the beginning and end a chorus of Greeks, in Tartarus a chorus of shades and demons, in Elysium a chorus of blest spirits, each occupying a single scene, with choral music and ballet, is all that divides the attention from the three leading characters. The subject, opening with a chorus at the tomb lamenting the death of Eurydice, is the familiar myth, only changed at the close, where Amor appears and finally restores the beloved one to Orpheus. There is

but little action, and that of the simplest character. Everything depended upon exciting the sympathies of the audience at the outset, and holding them to the end, and this too by musical means then new and strange. Twice in this work Gluck has shown the daring of genius trusting to its own powers, in a manner not surpassed by Beethoven himself. At the close of the first chorus Orpheus dismisses his friends, and is left alone not merely to execute a recitative and single air, written expressly for the singer to exhibit his powers, but a series of them, in which not an ornament or cadenza is admitted, and which nothing but the depths of expression in Gluck's music could redeem even now from the fatal fault of tedium. The other case is that in which Orpheus entering Tartarus is confronted by demons and shades, who by the force of his music at length are led to give way and allow him to pass on to Elysium. On Oct. 5, 1762, the opera was performed in public. Surprise and astonishment were the emotions with which the audience left the house. All hearts had been strangely moved. It had interested the company from the first singer to the most insignificant dancer in the ballet, and was given with rare perfection. The music made its way to all hearts, it became a most popular work in Vienna, and is still a stock piece in Berlin. In 1763-'5 Gluck composed *Enzio*, text by Metastasio; *La rencontre imprévue*, text by L. H. Dancovot (afterward very popular in a German translation with the title *Die Pilgrime von Mekka*); and *Il Parnasso confuso*, a dramatic poem by Metastasio, performed in the palace at Schönbrunn by the four daughters of Maria Theresa, sisters of Marie Antoinette, their brother, the future emperor Joseph, playing the harpsichord; revised *Telemacco* for the Vienna stage, and composed *La corona* for the archduchesses. The last piece was never performed, owing to the sudden death of the emperor Francis. The dramatic form of none of these works, although they gave Gluck opportunity to prove his inexhaustible fund of melodic and harmonic beauty, enabled him to follow the path struck out in the *Orfeo*. In the mean time Calzabigi prepared another libretto for him, founded upon the "Alcestis" of Euripides, and it was successful. In 1769 it was printed in score, with the celebrated dedicatory epistle to the grand duke of Tuscany. "When I undertook to set the opera *Alceste* to music," he writes, "I purposed carefully to avoid all those abuses which the mistaken vanity of the singers, and the too great good nature of composers, had introduced into the Italian opera; abuses which reduced one of the noblest and most beautiful forms of the drama to the most tedious and ridiculous. I sought therefore to bring back music to its true sphere, that is, to add to the force of the poetry, to strengthen the expression of the emotions and the interest of the situations, without interrupting the action or deforming the music by useless ornamentation. I was of opinion that

the music must be to the poetry what liveliness of color and a happy mixture of light and shade are for a faultless and well arranged drawing, which serve only to add life to the figures without injuring the outlines. I have therefore taken care not to interrupt the actor in the fire of his dialogue, and compel him to wait for the performance of some long tedious *ritornello*, or in the midst of a phrase suddenly hold him fast at some favorable vowel sound, that he may have opportunity by some long passage to exhibit his voice, or to make him wait while the orchestra gives him time to get breath for some long *fermate*. Nor have I thought myself at liberty to hurry over the second part of an aria, when perhaps this is just the most passionate and important part of the text, and this only to allow the customary repetition of the words four times; and just as little have I allowed myself to bring the aria to an end where there was no pause in the sense, just to gain an opportunity for the singer to show his skill in varying a passage. Enough; I wished to banish all those abuses against which sound common sense and true taste have so long contended in vain. I am of opinion that the overture should prepare the auditors for the character of the action which is to be presented, and hint at the progress of the same; that the instruments must be ever employed in proportion only to the degree of interest and passion; and the composer should avoid too marked a disparity in the dialogue between air and recitative, in order not to break the sense of a period, or interrupt in a wrong place the energy of the action. Further, I considered myself bound to devote a great share of my pains to the attainment of a noble simplicity; therefore I also avoided an ostentatious heaping up of difficulties at the expense of clearness; I have not valued in the least a new thought if it was not awakened by the situation and did not give the proper expression. Finally, I have even felt compelled to sacrifice rules to the improvement of the effect." In 1769 Gluck produced a third opera in the new style, *Paride ed Elena*, but it became popular only with musicians, and has in late years never been revived. In that year he was called to Parma to compose festival music for the marriage of the grand duke to Maria Amalia, daughter of Maria Theresa. Instead of a long opera, divided into acts, four short one-act pieces were prepared, *Le feste di Apollo*, *L'Atto di Bauci e Filemone*, *L'Atto d'Aristeo*, and for the fourth the *Orfeo* given in seven scenes, with the greatest success. For several years afterward he remained in Vienna, enjoying great social distinction, but composing nothing for the stage. His next great effort was the *Iphigénie en Aulide*, which after many struggles and the removal of innumerable obstacles was finally, through the influence of Marie Antoinette, produced on April 19, 1774, at the royal opera in Paris, whither Gluck had gone in the previous summer. It was followed by an embittered warfare between the adhe-

rents of the old school, then chiefly represented at Paris by Piccini, and the converts to the new ideas of Gluck. A catalogue of the writings of the Gluckists and Piccinists on the two sides of this question would fill one of our pages. The final result was the complete victory of Gluck. The composer followed up the *Iphigénie* with the *Orfeo ed Euridice*, adapted to the French stage, with the very material alteration of changing the part of Orpheus to that of a tenor, to suit the voice of Legros, there being no contralto adequate to it. The success of the work was as striking in Paris as in Vienna and Turin. In February, 1775, Gluck produced *L'Arbre enchanté*, in one act, at Versailles, a work of no great importance, and written merely for a festival given by Marie Antoinette to her young brother Maximilian. In August his *Cythère assiégée* was produced at the academy, but met with no distinguished success. Meantime he was zealously engaged upon three works, an adaptation of *Alceste* to the Prussian stage, and the operas *Roland* and *Armide*, texts by Quinault. *Roland* he laid aside on hearing that it had also been intrusted to Piccini, and wrote a sharp letter to Bailly du Rollet, which, without the consent of the writer, was printed in the *Année littéraire*, and enraged the Piccinists. Early in 1776 Gluck was again in Paris with his *Alceste*. It was produced, and hissed off the stage. The unlucky composer, who had been behind the scenes, rushed from the opera house, and meeting a friend threw himself into his arms in tears. As this ill success was mostly owing to cabals among the singers and the personal efforts of Gluck's opponents, and as the composer had influence enough to insure its repetition, it made its way with the public, and soon took its place only below the *Iphigénie* and the *Orfeo*. The war of the wits and critics was, however, more bitter than ever. Gluck himself seems to have been not a little embittered, and his polemical writings are often excessively keen. In the midst of his ill success with the *Alceste* came the news that his niece Marianne, whose ill health had caused him this time to visit Paris alone, had been carried off at the age of 16 with the smallpox. Upon her the childless musician had lavished all a father's love. She had been a pupil of Millico, and when but a child, as Burney records, was already a songstress of wonderful powers. It was not until Sept. 23, 1777, that the *Armide*, text by Quinault, from Tasso, was produced. It was rather coldly received, but is by many considered the greatest composition of Gluck, and by others only inferior to his later work, the *Iphigénie en Tauride*. Gluck returned to Vienna to work upon a new text, *Iphigénie en Tauride*, by a young poet named Guilbard. In November, 1778, he was so far advanced with it that he returned to Paris, where on May 18, 1779, it was produced. Like Haydn's "Creation," written when he was nearly 70 years of age, this opera of Gluck, written at

the age of 64, ranks among the highest efforts of the composer; with many, as before stated, it ranks the first. It is still, in a German translation, one of the favorite pieces on the Berlin stage. It was the crowning triumph of Gluck's system of operatic writing, and ended the series of works which gave direction to the genius of Mehul and Cherubini in Paris, Mozart and Beethoven in Germany, in their works for the stage. Another piece brought by Gluck to Paris at this time, the *Écho et Narcisse*, met with no great success. He returned to Vienna, and in 1783 had an attack of apoplexy, which caused him to decline the text of *Les Danaïdes*, sent him from Paris. To his dramatic compositions Gluck added only for the church a *De Profundis*, a psalm, *Domine Dominus noster*, and a part of the sacred cantata, finished by Salieri, *Le jugement dernier*. For months before his decease, Gluck had been obliged to use the greatest precautions to prevent a return of apoplexy. One day he invited two old Parisian friends to dine with him. After the meal, coffee and spirits were placed upon the table, and Mme. Gluck went out to order the carriage for the daily drive prescribed by the physician. One of the friends excusing himself from emptying his glass, the host at last seized it, swallowed its contents, and laughingly told them not to let his wife know of it, as everything of the kind was forbidden to him. The coach being ready, Mme. Gluck invited the guests to amuse themselves in the garden for a short time. Gluck took leave of them at the coach door. Fifteen minutes afterward he had another stroke; the coachman hurried home; his master had already lost all consciousness, and soon breathed his last.—See *Gluck et Piccinni*, by Gustave Desnoiresterres (Paris, 1872).

GLÜCKSTADT, a town of Prussia, in the province of Schleswig-Holstein, on the right bank of the Elbe, 27 m. N. W. of Altona; pop. in 1871, 5,073. The inhabitants are chiefly engaged in commerce and the whale fishery. The town was fortified in 1620 by Christian IV. It was unsuccessfully attacked by Wallenstein in 1627, by Tilly in 1628, by Torstenson in 1644, and yielded to the allies in 1814. The fortifications were demolished in 1815, and it was declared a free town in 1830. It passed into the possession of Prussia in 1866. The town has a gymnasium, and is connected by rail with Altona, Kiel, and Rendsburg. The royal line of the dukes of Holstein assumed from this town the name of Holstein-Glückstadt, while the ducal line bore the name of Holstein-Gottorp.

GLUE (Lat. *gluere*, to draw together), an impure variety of gelatine, used in the arts for uniting substances through its adhesive quality. It is obtained much in the same manner from the same substances as gelatine, but usually from the more refuse portions, as damaged hides and other tissues undergoing putrefaction. Glue obtained from bones by the use of acids is preferred to that which is obtained by steam,

the latter being more soluble in cold water. The strongest glue is made from the parings of ox hides, which yield over 50 per cent. They are steeped for several days in milk of lime to remove the hair, blood, and other impurities; then washed in cold water, drained on an inclined plane, and again washed. Exposure to the air converts the lime into carbonate, so that in boiling the caustic action of the lime is prevented. The material is then enclosed in a coarse cloth and put into a copper boiler, which is two thirds filled with rain water, and the whole is boiled. The dissolved glue mingles with the water outside of the cloth, and when the liquid sets into a firm jelly on cooling it is run into a deep vessel or settling back and kept warm for impurities to subside. Water is again added to the boiler, and the material in the cloth subjected to a second boiling, by which an inferior glue is obtained. The liquid in the settling back is drawn into coolers, where it solidifies, and is then cut into slices with a wire frame. The slices are laid upon netting in a drying room, in which there is a free circulation of air. The operation of drying is a critical one. Too much heat will cause liquefaction; a fog may cause mouldiness, and frost will split the slices. Good glue is of a pale brown color, hard and brittle, and breaks with a glassy fracture. Its other chemical and physical properties are like those of gelatine. The quality of glue may be judged of by the quantity of water which the dry glue will absorb in 24 hours. The best glue kept immersed in water of the temperature of 60° F. has absorbed 12 times its weight. Other qualities, it is said, take up a proportionally less quantity. Besides its use for cementing wood and hard substances, glue is employed in preparing the felt bodies of hats, and as an ingredient in the composition of inking rollers, to give them flexibility.—Several varieties of glue are employed in the arts, some of which may properly be noticed here, although they are not all preparations of gelatine. If glue is treated with a small proportion of nitric acid, it loses its property of gelatinizing when cold, though not that of causing substances to adhere together. With acetic acid a similar effect is produced. What is called liquid glue is made by slowly adding nitric acid to the ordinary preparation of glue in the proportion of 10 oz. of strong acid to 2 lbs. of dry glue dissolved in a quart of water. The product is a strong glue, which remains in a liquid state, and may be thus kept for years always ready for use. Marine glue is a preparation of caoutchouc dissolved in naphtha or oil of turpentine, with the addition of shell lac after the solution has by standing several days acquired the consistency of cream; two or three parts by weight of shell lac are used for one of the solution. The composition is then heated and run into plates, and when used it is heated to the temperature of about 250° F. It possesses extraordinary adhesive properties, and being

quite insoluble in water, it has been recommended as a material for fastening together the timbers of ships; so securely are these held by its application that it is said they will sooner break across the fibres than separate at the joint.

GLUKHOV, a town of Russia, in the government and 108 m. E. by N. of the city of Tchernigov, on the Yestmana; pop. in 1867, 10,747. It has eight churches and several schools, and was formerly the seat of the governor general of Little Russia.

GLUTEN, or **Vegetable Fibrine**, a tough elastic substance, named from its adhesive glue-like property, an ingredient in wheat especially, and in smaller proportion in most of the cerealia and in some leguminous plants. When wheat flour is well kneaded upon a sieve under a stream of water, the starch is removed in suspension in the water, and the soluble dextrine and sugar are washed away, and the gluten remains behind. This was supposed by Beccaria, who first noticed it, to be a distinct principle; but it is found still to retain a little starch, and other ingredients are separated from it according to their different reactions when treated with boiling alcohol. The pure vegetable fibrine is then found to constitute about 72 per cent. of the original gluten, while an albuminous substance called gliadine, vegetable caseine, and a vegetable oil make up the remainder. Gluten from rye flour contains very little of the tenacious ingredient, gliadine; and other grains furnish gluten of variable proportions of its ingredients. It is gluten which gives to the dough of wheat flour its peculiar tenacity, and it is owing to this that the escape of carbonic acid gas is arrested in the fermentation of wheat bread, and the product is consequently lighter and more spongy than other bread. Macaroni and vermicelli are preparations of gluten, and the flour of the south of Europe is said to be peculiarly adapted for this manufacture, as it generally contains a considerably larger proportion of gluten than that grown further north. But the proportion is variable in wheat of the same vicinity, and it may be increased by the use of animal manures, especially those richest in nitrogen. Liebig noticed that wheat manured with cow dung (which contains but little nitrogen) produced 11.95 per cent. of gluten; while another portion manured with human urine yielded the maximum of gluten, 35.1 per cent. Summer wheat grown in the *jardin des plantes* at Paris was found to contain 26.7 per cent. of gluten, while a sample of winter wheat gave but 3.33 per cent. As gluten is the most nutritious ingredient in the grains, its proportion has been carefully estimated by chemists. Vauquelin found it in wheat averaging 11.18 per cent.; Dumas 12.50 per cent.; and Dr. Lewis C. Beck, from 33 samples gathered from different parts of the United States, found an average of 11.72, the range being from 9.85 to 15.25 per cent. Prof. Horsford, by ultimate analysis of the wheat, in-

stead of separation of the gluten by mechanical washing, obtained an average of 15.14 per cent. from six samples. Payen found the proportions of gluten and other nitrogenous matters in wheat to range from 11.20 to 22.75 per cent.; in rye, 13.15; barley, 13.96; oats, 14.39; corn meal, 12.50; rice, 7.05. Prof. Johnston found in English fine wheat flour 10, in bran of the same flour 18, in Scotch oatmeal 18, and in corn meal 12 per cent. of gluten. It is found by very careful and repeated analyses that the bran of wheat and of most other cereals is richer in gluten, and consequently more nutritious, than the rest of the grain. Hence the preference for flour that by thorough bolting has been most completely deprived of bran is unwise; and the whitest flour is less valuable for its nutritive qualities than that made from the whole grain. The bran sometimes constitutes one quarter or more of the grain, and, according to the analyses of Prof. Johnston, contains 14 to 18 per cent. of gluten, while the fine flour contains only 10 per cent. Gluten is readily reduced in quantity, and its tenacity is diminished by injury to the grain. Flour dealers and bakers judge of the quality of flour by the tenacity of the dough made from a few grains of it.—The subject is further treated under **ALIMENT**.

GLUTTON, a carnivorous mammal, belonging to the family *mustelidæ*, subfamily *martinæ*, and genus *gulo* (Storr). The dental formula is that of the true martens, viz.: incisors $\frac{3}{1}$ — $\frac{3}{1}$, canines $\frac{1}{1}$ — $\frac{1}{1}$, premolars $\frac{4}{4}$ — $\frac{4}{4}$, molars $\frac{1}{1}$ — $\frac{1}{1}$ = $\frac{1}{1}$ — $\frac{1}{1}$, in all 38; the first three molars in the upper and the first four in the lower jaw are small, succeeded by a larger carnivorous tooth. In dentition and general structure the glutton resembles the



Glutton or Wolverine (*Gulo luscus*).

martens; but in its shape, and partially plantigrade feet, it so much resembles a small bear that many writers have placed it among the *ursidæ*. The head is rather pointed and bear-like, the eyes and ears very small, the body long and stout, the legs short and robust, the claws

large and sharp, the soles covered for the most part with bristly hairs, and the tail short and bushy. The glutton of Europe (*G. luscus*, Linn.) is about as large as a badger, of a deep brown, darkish on the back. The voracity of this animal, though great, has been much exaggerated. It is nocturnal, inhabits the coldest countries, as Russia and Siberia, and is active all winter. The American glutton, called also wolverene and carcajou, seems to be a paler variety of the *G. luscus*; the color is dark brown above, passing into black; a pale band runs on each side from the shoulder around the flanks, uniting on the hips; tail with long bushy hairs. The inner fur is soft and short, the outer long and coarse, like that of the black bear; across the forehead, on each side of the neck, and between the legs, are patches and tufts of white hairs. The average length to root of tail is 2½ ft., the tail from 10 to 12 in., and the height at shoulder about a foot; the width of the hind feet is nearly 5 in., so that their tracks in the snow are not unlike those of the bear. The wolverene is confined almost exclusively to the northern regions of the continent, being most abundant in the Rocky mountains near the arctic circle; it is occasionally seen in northern New York, and in the west has been found as far south as Great Salt lake. The strength, agility, cunning, and voracity attributed to the glutton by the older writers are mostly fabulous; it is by no means ferocious, is slow and heavy in its motions, not remarkably voracious, neither strong nor agile enough to pounce upon and kill deer and other large game, and avoids entering water in pursuit of prey. The wolverene generally hunts at night, spending the day in holes and caves; its food consists principally of mice, marmots, and other rodents, grouse and other birds which have plunged under the snow; there is no proof that it destroys the beaver, except occasionally; it may sometimes finish larger animals disabled by the hunter, by old age, or by accident, and when very hungry will eat carrion. It is notorious for following the traps of the hunter, and stealing therefrom both the bait and the captured animal, and for digging up and destroying *caches* of provisions. The wolverene is very suspicious, and rarely caught except in carefully concealed steel traps; it is very strong for its size, its weight being from 25 to 30 lbs. The young are produced once a year, two to four at a time. The fur of the wolverene is used for muffs and sleigh robes. The specific name *luscus* was given by Linnæus to an American animal, which happened to have but one eye; should the European glutton be separated from the wolverene, it would be properly called *G. borealis* (Nilsson).

GLYCERINE (Gr. γλυκός, sweet), the sweet principle of oils, a triatomic alcohol, the base of the compounds found in animal fats and also in some vegetable substances, discovered by Scheele in 1779. Its composition is represented by the formula $C_3H_5O_3$. It is a colorless, transparent, sweet sirup, without odor, of spe-

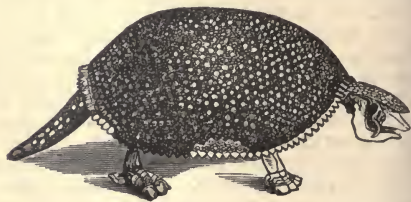
cific gravity 1.28; it is inflammable, mixes freely with water, taking it from the air, is also soluble in alcohol, sparingly in ether, and dissolves salts that are soluble in water; it does not become rancid by exposure, but with animal tissue may be made to ferment. At a temperature above 600° F. it is decomposed, being converted into acroleine, acetic acid, and inflammable gases. Between 500° and 600° it may be distilled with only partial decomposition. It may be cooled to -4° F. without freezing. Berthelot has succeeded in combining it with the fatty acids, and has thus produced the organic fatty substances, stearine, margarine, oleine, &c. This was effected by keeping the mixture of acids and glycerine at a temperature of 212° for several days in close vessels. At higher heat much less time is required.—Glycerine is a product of the process of saponification. As prepared by the pharmacutists, it is taken up with boiling water from its mixture in a free state with the plumbiferous soap called lead plaster. The plaster is made by boiling together litharge (oxide of lead), olive oil, and water. The oil is decomposed by the lead taking its acids, and the glycerine is thus liberated. When hot water is added in equal quantity to the plaster, the mixture is well stirred, and the liquid part is decanted; any lead that may be present is thrown down by a current of sulphuretted hydrogen, and is got rid of by filtering. The water is finally removed by evaporation at a temperature below 212°, leaving the glycerine. Various other methods of preparing it are in use. The mother liquor of the soap factories affords a convenient source of it. From this it is separated by adding a slight excess of sulphuric acid, heating the solution with carbonate of baryta, filtering, and, after the filtrate has been concentrated by evaporation, taking up the glycerine with alcohol, which is afterward to be distilled off. A hot solution of fat has been decomposed by injecting into it superheated steam. The fatty acids and glycerine, collected in a receiver, separate in two layers, the glycerine at the bottom. The acids can be drawn off, so as to leave the glycerine with no other mixture than water. The method of detecting the presence of glycerine when in small quantity is based on the marked qualities of the substance acroleine into which it is in part converted by heat. If the substance supposed to contain it be separated from foreign mixture as far as possible and rapidly heated, either alone or with a little anhydrous phosphoric acid, the acroleine generated, in case glycerine was present, will be detected by the pungent acid odor, somewhat like that from the wick of a candle just extinguished. Glycerine is formed in small quantities during the process of alcoholic fermentation. C. Friedl and R. Silva have succeeded in preparing it artificially from the chloride of propylene, which in turn is made without the use of glycerine itself.—Owing to its property of long continuing moist,

and its strong affinity for water, it may be applied to the skin or to mucous surfaces, when it is desired to prevent dryness and to use a bland and soothing application, as in chapped hands or lips, many skin diseases, a parched and glazed condition of the mouth, &c. If applied undiluted, it withdraws water from the moister tissues under it. For external uses it may be advantageously combined with tannin, carbolic acid, or borax, all of which are readily dissolved by it. With starch a plasma of any required consistency may be formed, which takes the place of an ointment, and has the advantage of not being greasy, and being capable of easy removal by washing. Inferior varieties of glycerine may contain irritating impurities. Either alone or with a small proportion of carbolic acid, it is a very useful medium for the preservation of anatomical specimens in a condition of pliability, and is also of great value in microscopic anatomy. Glycerine is a powerful solvent, and may be used in pharmacy to prevent drying as well as decomposition. The vegetable alkaloids dissolve in it readily, and may be used in this form for subcutaneous injection. It has been suggested for internal use in diabetes, instead of sugar, and also as a substitute for cod-liver oil; but experience does not assign to it much value for these purposes. For use in cosmetics and perfumery it is largely manufactured, its soft agreeable qualities, without greasiness or liability to putrefy, rendering it an excellent ingredient in soaps for the toilet, pomade, hair tonics, &c. It is lately employed in the photographic art, and its use is extending for a variety of new purposes. A glycerine ointment of much repute for chapped hands and excoriations is made as follows: $\frac{1}{2}$ oz. of spermaceti is melted together with a drachm of white wax and 2 fluid oz. of oil of almonds, by a moderate heat; the mixture is poured into a Wedgwood mortar, when a fluid ounce of glycerine is added to it and rubbed till the ingredients are thoroughly mixed and cold. The consumption of glycerine in the manufacture of beer amounts to more than 20,000 cwt. per annum. It also finds extensive use for the following purposes: mixed with water to fill wet gas metres; to lubricate the inside of moulds for plaster casts; to prevent the shrinkage of wooden vessels; to preserve meat, fruit, candies, medicines, mustard, and tobacco; as a hair wash; in soaps and cosmetics; for the extraction of perfumes; to impart elasticity to paper; in various photographic operations; as a solvent for certain aniline colors; in calico printing; in the preparation of leather; as a substitute for oil in delicate machinery; as a float to swimming compasses; in mercurial manometers; as a substitute for alcohol in the preservation of anatomical preparations; to prevent the rusting of instruments; in the artificial production of oil of mustard; to cure wounds, burns, and bites of venomous insects; in the preparation of cements; for throat diseases; in copying ink; in chemistry to prevent

the precipitations of the heavy metals; and very largely in the manufacture of the explosive compounds nitro-glycerine, dynamite, dualline, and lithofracteur. (See Explosives.)

GLYNN, a S. E. county of Georgia, bordering on the Atlantic, and bounded N. by the Altamaha river; area, about 400 sq. m.; pop. in 1870, 5,376, of whom 3,450 were colored. It is traversed by the Macon and Brunswick and the Brunswick and Albany railroad. The surface is level and occupied partly by sandy pine barrens, partly by vast swamps, which when drained are productive. The sea island cotton grows here in perfection. Several islands on the coast, one of which is about 12 m. long, are included in the county. The chief productions in 1870 were 15,589 bushels of Indian corn, 6,774 of sweet potatoes, 167 bales of cotton, and 740,880 lbs. of rice. There were 2 manufactories of tin, copper, and sheet-iron ware, 1 iron foundry, and 4 saw mills. Capital, Brunswick.

GLYPTODON, a gigantic fossil mammal, belonging to the edentate order with the *megatherium* and *mylodon*, but to the family *dasyproctæ* or armadillos, found in the post-tertiary



Glyptodon clavipes.

deposits of the pampas of South America, and especially in the neighborhood of Buenos Ayres. This animal, with the fossil genera above mentioned, establishes the transition between the sloths and the armadillos, and also indicates some pachyderm affinities. Four species have been described by Prof. Owen, of which the largest is the *G. clavipes*; this species, in the structure of the foot and the articulation of the lower jaw, approaches the pachyderms; it resembles the megatherioids in the strong descending process of the zygomatic arch, compressed from before backward; the cranium was protected by dermal plates, and its well developed ridges indicate the existence of very powerful muscles. The teeth, eight on each side of each jaw, have a large proportion of hard dentine, and are characterized by two lateral sculptured grooves, whose wide and deep channels divide the grinding surface into three portions; hence the generic name applied by Owen, which means "sculptured tooth." The back and sides were covered by a carapace composed of thick polygonal bony plates, united by sutures, smooth on the inside, rough and sculptured externally, to the number of more than 2,000. The length of the largest living armadillo, covered with a flat-

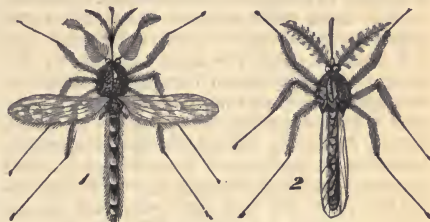
tened shield, is about 3 ft.; the size of the glyptodon may be imagined from the measurement of its carapace in the museum of the royal college of surgeons: the length, following the curve of the back, is 5 ft. 7 in.—in a straight line, or the chord of the arc, 4 $\frac{3}{4}$ ft.; the breadth, following the curve, is 7 $\frac{1}{2}$ ft.—in a straight line, 3 $\frac{1}{2}$ ft. The tail measured 1 $\frac{1}{2}$ ft. in length, and 14 in. in circumference at the circular base; it was slightly depressed toward the apex, and gently curved, with the concavity upward; the caudal vertebrae were enclosed in an inflexible sheath of bony plates, terminated by two ossicles, like a bivalve shell, enabling it to pierce the soil if necessary. The feet were short and stout, armed with depressed nails. The glyptodon, in its firm, convex carapace, scale-covered tail and head, short limbs, and consequent slow motions, presents many external analogies to chelonian reptiles, and in its size and shape must have resembled rather the living Galapagos tortoise than the great armadillo. Like the living armadillo, the extinct glyptodon was confined to the warm parts of South America. Other species described by Owen are *G. ornatus*, *G. reticulatus*, and *G. tuberculatus*, all obtained from the vicinity of Buenos Ayres.

GMELIN. I. **Johann Georg**, a German naturalist, born in Tübingen, June 12, 1709, died there, May 20, 1755. In 1731 he became professor of chemistry and natural history in St. Petersburg. In 1733-'43 he made a scientific journey through Siberia. In 1747 he returned to Tübingen, and in 1749 was appointed professor of botany and chemistry there. His *Reisen durch Sibirien* (4 vols., Göttingen, 1751-'52) and *Flora Sibirica* (4 vols., St. Petersburg, 1749-'70) are his principal works. II. **Samuel Gottlieb**, a German botanist, nephew of the preceding, born in Tübingen about 1744, died at Akhmetkent, in the Caucasus, July 27, 1774. He was professor of botany in St. Petersburg, and travelled extensively through southern Russia and the adjacent countries. While on his way from Derbend to Kisliar, he was seized and imprisoned by the khan of the Kaitak tribe, and died of privation and ill treatment. His chief works are *Historia Fucorum* (1768), and *Reisen durch Russland zur Untersuchung der drei Naturreiche* (4 vols., 1770-'84), of which the concluding part is by Pallas. III. **Johann Friedrich**, nephew of Johann Georg, born in Tübingen, Aug. 8, 1748, died in Göttingen, Nov. 1, 1804. In 1771 he became professor of natural history and botany at Tübingen, and in 1778 professor of medicine and chemistry at Göttingen. He published, among other works, *Onomatologia Botanica completa* (10 vols., 1771-'8); *Allgemeine Geschichte der mineralischen Gifte* (1777); *Allgemeine Geschichte der Pflanzengifte* (1777); and *Geschichte der Chemie* (3 vols., 1797-'9). He was also the editor of the 13th edition of Linnæus's *Systema Naturæ*. IV. **Leopold**, a German chemist, son of the preceding, born in Göttingen,

Aug. 2, 1788, died in Heidelberg, April 13, 1853. He was educated at Göttingen, Tübingen, and Vienna, and from 1817 to 1851 was professor of medicine and chemistry at Heidelberg. In 1820 he made with Tiedemann a series of experiments on digestion, the result of which was published in his *Die Verdauung* (2 vols., 1826-'27). His principal work is his *Handbuch der theoretischen Chemie* (3 vols., 1817-'19; 5th ed., completed by Schlossberger, List, and Liebig, 7 vols., 1853-'62). There is an English translation of this work, by Henry Watt (9 vols., London, 1848-'55).

GMÜND, or **Schwäbisch-Gmünd**, a town of Württemberg, in the circle of the Jaxt, on the Rems, 28 m. E. N. E. of Stuttgart; pop. in 1871, 10,739. It has a Latin school, a Catholic normal school, institutions for the blind and the deaf and dumb, an insane asylum, two hospitals, important manufactures of gold, silver, copper, and bronze ware, and considerable hop culture.

GNAT, a name commonly given to the family *Culicidae*, of the proboscidean division of the order *Diptera* or two-winged insects; the *cousin* of the French, the mosquito of the

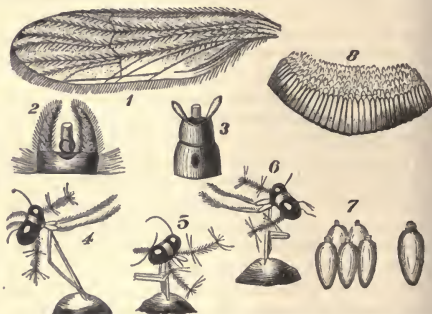


1. Female (greatly magnified). 2. Male.

United States. The gnats belong to the genus *Culex* (Linn.), which is characterized by a soft, elongated body; long legs; large head and eyes; long, many-jointed antennae, most plumose in the males; uniform and hairy palpi, longest in the males; a sucking proboscis, formed of a membranous sheath enclosing from two to six sharp bristles or lancets, which take the place of jaws, and whose punctures, therefore, are properly called bites; the side pieces of this apparatus serve not only as suction tubes, but as supporters and protectors of the lancets; wings horizontal, delicate, and many-veined; the winglets, two little scales behind the wings, and moving with them, are small; behind these are the knobbed balancers or poisers. The old genus *Culex* was divided by Meigen into three, and was by him restricted to such gnats as have the palpi in the males longer than the proboscis, and very short in the females; the other two were *Anopheles* (Meigen), in which the palpi of the males are as long as the proboscis, and *Aedes* (Hoffmannsegg), in which they are very short in both sexes; to these were afterward added *Sabethes*, with palpi shorter than proboscis; *Megarrhinus*, with very long recurved proboscis and short palpi; and *Psorophora*, with a small

appendage on each side of the prothorax. Other genera, ill-characterized for the most part, have been added by modern systematists. The names gnat and mosquito are also given in some places to members of the family *tipuladæ*; and our own mosquitoes belong to several genera, among which is the genus *culex*, properly confined to the more northern regions of the continent. Dr. Harris mentions five species of *culex* and one of *anopheles* as found in New England; to these many species and several genera must be added. Some species are active by day, others only by night, but both are equally fond of human blood; the former are found principally in marshes and damp woods and rarely in houses, and are of more brilliant colors than the nocturnal species. The males with plumed antennæ do not annoy us by their bites, but simply flit from flower to flower, sipping the dew and sweet juices, requiring but little if any food, propagating their species, and soon after perishing. The female gnats are most persistent biters and annoying musicians, at almost all seasons of the year; from the tropics to Lapland and arctic America; man is obliged to adopt some contrivance to protect himself from their attacks, either the thick coat of grease of the northern regions, the sand bed of the tropics, the smoky smudge of the woods, or the mosquito bars and curtains of civilized life. Gnats have been known to appear in such swarms as to constitute an insect plague, darkening the air like clouds of smoke, arresting the progress of invading armies, and rendering whole districts for the time uninhabitable; attacking not only man but beasts, and, even when not biting, filling every crack and corner with their countless multitudes. When we consider the immense number of these insects, and the comparatively small proportion which can ever taste human blood, we must admit, what experiments with sweetened fluids have confirmed, that vegetable juices form the food of the greater number of females, and perhaps the natural food of all; many males probably do not eat at all. The sucking apparatus is admirably contrived for obtaining fluids, animal or vegetable, and these insects are provided with a sucking stomach independent of the proper digestive cavity. The sucker is well described and figured by Réaumur in his "Mémoires;" the flexible sheath gives support to the lancets while they penetrate the skin; the point of the combined lancets is sharper than the finest needle, so that the size of each of the several weapons must be very small; the wounds made by this instrument would be insignificant, were it not for an irritating secretion from the proboscis, which in some delicate skins produces obstinate itching, and, in rare instances, even irritable ulcers.—The metamorphoses which gnats and mosquitoes undergo are very curious. The eggs are deposited in almost any natural or artificial receptacle for fresh water, and are arranged in a boat-shaped form; fixing herself

by the four anterior legs to some object at the surface of the water, the female crosses her hind legs in the form of the letter X; bringing the latter close to the end of the body, on a level with the water, the first egg is received and retained in place by the crossed legs; as the eggs are extruded they are placed side by side vertically, adhering firmly together by the glutinous substance which covers them; when the stern of the egg raft is properly raised, it is pushed farther from the body by the succeeding ova, always retained in place by the legs on the sides; when the raft is about half made and its shape is determined, the legs are uncrossed and placed parallel, and the prow of the boat is narrowed and raised like the stern. The boat is always of the same shape, containing from 250 to 350 eggs, and is abandoned by the mother to the mercy of the winds and waves, which can neither sink, wet, nor break it up; even a temperature below freezing cannot destroy the life within these eggs. The larvæ come out in a few days from the lower end of



1. Wing of gnat, showing nervures and small cells. 2. Termination of abdomen of male. 3. Termination of abdomen of female. 4, 5, 6. Modes of operation of gnat's sucker. 7. Gnat's eggs. 8. Boat of gnat's eggs.

the eggs, which are arranged somewhat like the seeds of the ripe sunflower, and the empty shell boat is soon destroyed by the weather. The larvæ of gnats and mosquitoes are the well known "wigglers" seen in warm weather in almost every collection of standing water; they remain, as it were, suspended from the surface of the water, head downward, breathing air by means of a respiratory tube which goes off at an angle from near the end of the body, communicating with the tracheæ; the tube and the terminal joint are provided with radiating hairs; the head is round, distinct, with antennæ and ciliated organs which keep up a constant current of water toward the mouth, and bring within their reach the minute animalcules on which they feed; the thorax and ten-jointed abdomen are furnished with lateral pencils of hairs. If disturbed, these larvæ quickly wriggle to the bottom, but soon come again to the surface and suspend themselves by the respiratory tube. Some species are comparatively free from hairs in

this condition. After remaining in the larva state from five to fifteen days, according to the weather, and changing their skins two or three times, they are changed into pupæ, called tumblers from the manner in which they roll over and over in the water by means of the fin-like paddles at the end of the tail; they are very quick in their motions, and swim with the head upward; the respiratory openings are at the end of two tubes situated just behind the head, so that the little tumblers remain near the surface, head upward, to take in air; in this state, which lasts five or ten days, according to circumstances, the insect takes no food; the future gnat can be distinguished through the transparent covering of the pupa. When the perfect insect is ready to come forth, the pupa skin bursts open on the back toward noon on a warm, still, sunny day, and the head of the gnat makes its appearance, followed soon by the thorax; this is a process of great danger to the insect, as the slightest breeze would tip over the emerging form, and consign it to certain death in the water; after it has succeeded in raising its body except the tail, and stands erect like a mast in the pupa shell boat, it extricates the front pair of legs and places them for support on the surface of the water; the heavy and wet wings are now slowly unfolded, that the sun and air may dry them; this effected, the danger is over, and the other legs are drawn forth and extended on the edge of the pupa case, the body is stretched out, the antennæ and proboscis elevated; by this time the wings are dry and fully expanded, and the insect flies off to revel among the flowers or in search of blood, according to the sex. The source of the buzzing noise has been much discussed by naturalists, and is still the subject of dispute; it has been ascribed to the mouth by Mouffet, to the friction of the base of the wings against the chest by Kirby; the winglets, the poisers, the motion of the wings, the rapid passage of air through the thoracic stigmata, and the vibrations of the thorax from the contraction of the muscles of the wings, have been supposed to be the cause by other entomologists; by whatever organ it be produced, Siebold says it is always due to the action of voluntary muscles, and has no connection with the respiratory system. It is probable that the sound is produced by the combined action of the wings and by the thoracic vibrations consequent thereon. It has been estimated by Baron de la Tour that the gnat vibrates its wings 50 times in a second. This very rapid movement probably depends on a peculiar form of muscle which has been detected in the mosquito and other *diptera*; the fibrillæ are not bound together as in ordinary striated muscles, but are separate and parallel, formed by the aggregation in a linear series of little disks with regular interspaces; contraction of these independent fibrillæ takes place by the approximation of these disks to each other; some are contracting while others are

relaxed, so that a constant and rapid movement of the wings is secured. It is certainly a remarkable example of the extent of modern microscopic investigation, that the minute muscles of the wings and legs of the mosquito can be dissected and studied. Some of the biting *culicida* do not make a boat of eggs, but string their ova end to end; others deposit them in soft mud or in dry sand; but all require moisture in the larva state. As the eggs are developed into the perfect insects in about three weeks, many broods are hatched in the course of the warm season, fully explaining their occurrence in large numbers; fortunately only a small portion of the pupæ succeed in extricating themselves from their cases; thousands of them perish by drowning, and are devoured by fish, reptiles, and aquatic insects; the perfect gnats supply food for carnivorous insects, the great tribe of fly-catching birds, and the bats.—The family of *tipulada* are also called gnats; these are often seen performing their aerial dances during the summer, and in sheltered places even in mild days in winter, preferring the decline of day; these dancing companies are said always to consist exclusively of males; any attempt to intrude upon their sportive circles shows their quickness of vision and of motion, as the whole company is at once removed to a distance. These gnats sometimes crowd into houses in immense numbers.

GNEISENAU, August, count, a Prussian general, born at Schilda, Oct. 28, 1760, died in Posen, Aug. 24, 1831. He served in the Austrian army, and in that of the margrave of Anspach-Baireuth, with whose troops he served in America under the English, shortly before the close of the revolutionary war. He became captain in the Prussian army in 1789, and after the battle of Jena was appointed commander of the fortress of Colberg (1807), and held the place till the peace of Tilsit. The resentment of Napoleon caused his dismissal (1809), but he was sent on secret missions to various courts. Afterward he was attached to Blücher's army as quartermaster general, and as chief of the staff. (See **BLÜCHER**.) He took a leading part in the Silesian campaign of 1813, and after the battle of Leipzig was made lieutenant general. He rendered important services during the campaign of 1814 in France, and is said to have advised the march to Paris. After the peace he was made count and general, and received a large estate. After the return of Napoleon from Elba he again served with Blücher, and effected a skilful retreat from Ligny (June 16), enabling the Prussians to reappear at Waterloo (on the 18th), and to decide the fate of the campaign. He now took part in the negotiations for peace, was made commander of the Rhenish corps, and accompanied Blücher to England. Disappointed in his expectation of constitutional liberty, he tendered his resignation. In 1818 he was appointed governor of Berlin, and in 1825 field marshal; and in 1831, during the Polish insurrection, he commanded

the army of observation on the Polish borders, soon after which he died of cholera.

GNEISS, one of the metamorphic rocks, of the same composition with granite, from which it differs in presenting the three ingredients, quartz, mica, and feldspar, in tolerably distinct layers. The whole mass is often divided into distinct beds or strata, and these exhibit a tendency to cleave along the planes in which the mica is most largely distributed. By increased proportion of mica and loss of feldspar, it passes into micaceous slate. The name gneiss is sometimes given to the group of metamorphic rocks, including the micaceous and hornblende slates, quartz rocks, &c. They are also called hypozoio in reference to their position beneath the fossiliferous strata. The series is familiarly known in the eastern and middle states, ranging through Vermont, Massachusetts, the S. E. part of New York, northern New Jersey, eastern Pennsylvania, Maryland, and Virginia. The gold region lies in this group.

GNEIST, Rudolf, a German author, born in Berlin, Aug. 13, 1816. He is professor of jurisprudence in and pro-rector of the university of Berlin, has been a leading liberal member of the Prussian chamber, and is the author of *Das heutige englische Verfassungs- und Verwaltungsgesetz* (2 vols., Berlin, 1857-'60), *Die Geschichte des Selbstgovernment in England* (1863), *Geschichte und heutige Gestalt der Aemter und des Verwaltungsrechts in England* (2 vols., 1866), *Freie Advocatur* (1867), *Die preussische Kreisordnung* (1870), *Der Rechtsstaat* (1872), and other works on Roman and German jurisprudence and British institutions.

GNESEN (Pol. *Gniezno*), a town of Prussia, in the province and 30 m. N. E. of the city of Posen; pop. in 1871, 9,910. It is surrounded by walls, has a fine cathedral and other churches, an ecclesiastical seminary, a monastery, and a nunnery, and is the seat of a cathedral chapter. Four annual fairs are held there. It was the capital of Poland till 1320, when it was superseded by Cracow. It has been many times besieged, taken, and pillaged. The archbishops of Gnesen were the primates of the state, and acted as vicars during the often disputed elections of the kings.

GNOSSUS, or **Gnosus**. See **CROSSUS**.

GNOSTICS (Gr. *γνῶσις*, knowledge), a name given to various heretical sects in the early Christian church. We know them mainly through their opponents, almost nothing remaining of Gnostic writings except the fragmentary quotations found in orthodox authors. Gnosticism was a natural result of the contact of Christianity with oriental and Greek philosophy, and was the earliest attempt to construct a philosophical system of faith. It undertook to answer the most difficult questions, such as that of the origin of evil, and soon became extravagant, and met the opposition of the leading Christian writers. Gnosticism was now generally condemned as heretical, and, after having been most prosperous in the

2d century, declined in the 3d, and in the 6th came, with other heresies, under the ban of the Justinian code. It was a speculative system, and exercised little influence upon the masses of the people. It was also mainly confined to the eastern church, and had little to do with the development of the West.—There are three principal theories of the character of Gnosticism. Baur treats it as a philosophy of religion resulting from the comparison of various religious systems; Neander as a fusion of Christian ideas with oriental theosophy, caused by the prevalence of sensuous ideas within the church; Möhler as an intense and exaggerated Christian zeal, seeking some practical solution of the problems of sin and evil. All minor theories of the purpose and motives of Gnosticism can be comprehended in one of these; and these three agree in the general definition, that Gnosticism is an attempt to solve the great problems of theology by combining the elements of pagan mysticism with the Jewish and Christian traditions. It is impossible to make an accurate definition of a system of which the speculations are so vague, and the materials for judgment so scattered and fragmentary. Different writers vary widely in their method of classifying the various Gnostic schools. Some classify them by opinions, some by origin, and some by locality. The chief Gnostic ideas may be summed up under seven heads: 1. God is infinitely removed from the actual world, enclosed in the abyss (Gr. *βάθος*), with which he is in fact confounded; he is separate from every work of temporal creation, incomprehensible by any mortal, and communicates with the lower world only through the mediation of the æons (Gr. *ἄων*, age or era), whom he sends forth from the depths of his grand solitude. He has infinite development in the forces which he sends, but no personal or special providence. He is the sum of being, yet the extreme of abstraction, and is even called the Not Being (*ὄνκ ὄν*). 2. Below the abyss, in which God alone dwells, or surrounding this abyss, is the Pleroma (Gr. *πληρομα*, fullness), that world of light and glory which the æons inhabit. These æons are emanations from God's central fullness, are embodiments of his divine attributes, and fulfil the functions denoted by their several names. Among the higher æons are Mind, Reason, Power, Truth, and Life. All of these are styled æons, because they are in some way the representatives of the Eternal Being; but only one of them, Nous or Mind (*νους*, or in late authors *νοῦς*, intellect), proceeds directly from the Deity. The others emanate in descending succession from the first æon. One Gnostic writer compares the emanation of these æons from the Supreme Being to the tones of the voice lessening steadily to a faint echo. The number and characteristics of these æons are variously stated; according to Valentinus, there were 365 of them; but according to all, only the lowest of them has anything to do with the material world, occupying the point

where the spiritual and material worlds touch each other. The office of the higher æons is to people and take care of the spiritual world. 3. Matter is infinitely separated from God, and the material world is the antithesis of the spiritual world. Hyle (*ὕλη*, matter) is either absolute deadness and emptiness (*κένωμα*), or is a positively evil substance. The creator of this material universe is the Demiurge. He is himself a creature of the lowest of the æons, Achamoth. He not only creates and rules the terrestrial world, but has equal sovereignty over the planets and stars. He fulfils, or as some say usurps, the functions of the infinite God. He appears in Jewish history as Jehovah. Other names by which he is known are those of Archon and Jaldabaoth, the son of Chaos. The immediate work of the Demiurge is evil, and it takes the world of man and matter further away from God and the world of light. 4. Man has a threefold nature, of spirit, of body, and of soul. His soul-nature stands between the other two, and forms their connecting bond. Men are divided into three classes, according to the predominance of one or other of these three natures. The first of these classes enjoy a light from the world of æons; the second are left wholly to material and hylie influences; while the third are under the direction and influence of the Demiurge, who can save them from utter debasement, but cannot give them spiritual life. Historically, the Christians constitute the spiritual world; the pagan world forms the carnal class; and the Jews occupy the intermediate place. But in dividing the Christians of their own time, the Gnostics numbered two classes, the select few of their own number who were admitted to the divine secrets, and the large body of common believers, who were not able to rise above the psychical condition. Some of them maintained that though man as connected with matter is by nature sinful, and though the Demiurge wished to create man in his own image, yet unwittingly he reproduced in this work of his breath, not his own image, but a shadow of that divine original which moved before his imagination. Man is better than the intention of his creator. 5. Redemption reaches only the pneumatic and psychic classes; the carnal or hylie class are destined to annihilation when their material life shall close, and with them such of the psychic class as have not accepted the influence from the Pleroma. The instrument of redemption is the æon Christ. This æon came down from the spirit world, assumed bodily shape without being actually united to any material body, and walked among men in Judea as Jesus of Nazareth, not a real human person, but an optical illusion, the phantasm of a spiritual idea. Some of the Gnostics were willing, indeed, to speak of the human life of Christ; but all denied that his body was composed of the elements of corrupt and sinful matter; it was an ethereal body of more delicate fabric than the common human body. Hunger would not

impel him to eat, nor thirst to drink. Yet this ethereal body was too gross for the Pleroma, and was left in the sun at Christ's ascension. The advent of Christ upon the earth was not the birth of a prophet, or the coming merely of a promised Messiah, but a spiritual apparition to overthrow the work of the evil spirit—"an incarnation of the spirit of the sun." The presence of Christ anywhere made men conscious of this divine nature. They might doubt of the humanity of Christ, but not of his divinity. The process of redemption, in the Gnostic theory, is the communication through the æon Christ of a divine life to the world of man, the revelation of that life through this mediator. Christ redeems the world as he draws the spiritual in the world toward the heaven of God. His sufferings and death have no influence in the redeeming work, since, in the first place, they were illusory, and in the second place, sufferings do not redeem, but only punish. The manifestation by his acts and words of the spirit of God made Christ the redeemer. Some expressions in Gnostic writings might be interpreted as teaching views of redemption more in harmony with the church creeds; but nowhere was any doctrine of atonement stated, or any stress laid upon the crucifixion as its central point. Marcion extends the redemption into the world of Hades, and maintains that Christ descended into hell to lead back the virtuous and believing heathen to share salvation with the spiritual Christians. In regard to the means of profiting by the redemption of Christ, the Gnostic teachers were not agreed. Marcion taught a doctrine resembling that of Paul, making faith the means of justification and the ground of reconciliation. But most of the sect held that only "gnosis," the rare superior intelligence and comprehension of divine truth, could enable men to receive the gift of Christ. This spiritual knowledge was the evidence of salvation to believers. The actual manner of union between Christ and his redeemed ones is very vaguely described in the Gnostic writings, and their language in speaking of redemption and its issues is confused. 6. Although the Gnostics were charged with boasting that they had schools rather than churches, yet they held to a church which should have a twofold life, for the mass of believers, and for the initiated: for the first, common exoteric doctrines, and for the second, spiritual esoteric doctrines, revealed to a secret sacred society within the proper circle of the church. Practically they did little, and many of them were content to theorize about spiritual truth, while submitting to the recognized ecclesiastical order. Baptism was to them the important rite, since Jesus became Christ at his baptism, and through this rite the higher spirit was imparted to the sensuous soul. It was the sign of their emancipation from demiurgic rule. A few objected to baptism as too physical a rite, but most of them celebrated it with great show and solemnity.

The Lord's supper was to them of less importance, being only the sign of a material feast, on the reality of which their views of the nature of Christ threw doubt. Some of them kept the feast days of the church, and the followers of Carpocrates allowed the use of images both of Jesus and the saints. While the idea of the church was to a great extent discarded, much of its ritual and its splendor was retained. 7. In practical morals two tendencies are to be observed in the Gnostic schools. On one side is the ascetic tendency, which seeks a complete emancipation from matter and from bodily passion, as the seat of sin; on the other side the licentious tendency, which plunges into excess, on the plea that sensual passion is most surely overcome by satiety. Many of the charges brought against this latter class of Gnostics are, however, to be taken with large abatement. There is no evidence that their average morality was below that of the orthodox Christians, or that the ascetic tendency was carried to such extremes among them as among the Jewish Essenes or the later Christian hermits. Gnosticism, in the 2d century at least, was rather a speculative than a practical heresy, a system of intellectual vagaries rather than of moral corruptions.—In speaking of the principal Gnostic teachers, the geographical division may be adopted as most convenient, if not most philosophical. Of the precursors of Gnosticism before the formation of its principal schools are mentioned: Simon Magus, whose authentic history is related in the Acts, but of whom legends abound, and after whom the sect of the Simonians was named; Menander, said to have been a disciple of Simon; Cerinthus, who considered Judaism a preparation for Christianity; Nicolaus, of whom nothing is known except that he is reckoned as the founder of the sect of the Nicolaitans, noted for their lax morality, and mentioned in the Apocalypse. Of the Syrian school, the chief characteristic of which is dualism, the principal teachers were: 1. Saturninus, a follower of Menander, who lived at Antioch about the year 125, in the reign of Hadrian. He maintained that the lowest æon was formed from the spirits of the seven planets; that the evil spirit formed a race of hylic men to counteract the race formed by this æon; and that Christ was the æon Nous in a visible but not corporeal body. His school, never very numerous, was confined to the neighborhood of Antioch, and was hardly known in the succeeding century. 2. Bardesanes, who flourished at Edessa in the latter half of the 2d century. (See BARDESANES.) 3. Tatian, who lived in the 2d century, and is commonly reckoned among the Christian apologists. (See TATIAN.) In the Egyptian school, characterized by the emanation theory, the principal teachers were: 1. Basilides, who taught in Alexandria about the year 120, whose followers, the Basilidians, existed as late as the 4th century. (See BASILIDES.) 2. Valentinus,

an Alexandrian Jew, who taught in Rome about the middle of the 2d century, and died in Cyprus about the year 160. His system of æons is divided into three series of 15 pairs, an ogdoad, a decad, and a dodecad. They are male and female. His "threefold Christ" differs from that of Basilides. His elaboration of Gnostic ideas was more complete and ingenious than that of any other writer, and his influence was longer and wider in its extent. J. Matter numbers seven distinguished names among the successors of Valentinus, five of whom founded schools; these are Secundus, Ptolemy, Marcus, Colarbasus, Heracleon, Theodotus, and Alexander. 3. The Ophites, or Naasenes, a powerful sect, yet without any distinguished name among their teachers, who traced their doctrine to James, the brother of the Lord, and existed at a later period than the other Gnostic sects. As their name implies, the serpent was for them a sacred emblem. They regarded the fall of man as a progress rather than as a loss, named the Jewish Jehovah "Jaldabaoth," or the God of chaos, preferred Judas to the other disciples, affirming that he betrayed Christ to destroy the kingdom of God's enemy, and denied that the real Christ was ever crucified. The Sethites and Cainites were branches of this sect. The moral character of the Ophites was bad, and the sect came not only under the constant rebuke of the church teachers, but under the imperial ban. Of the Gnostics of Asia Minor, the one eminent name is that of Marcion, an austere moralist and a vigorous reasoner. He taught at Rome about the middle of the 2d century. His system is characterized by the constant antithesis between Christianity and Judaism, by a rejection of the Old Testament and of all apostolic authority except that of Paul, and by a rigid asceticism. His followers were numerous even to the time of Mohammed. Of the Gnostics not localized, but mostly related by their doctrines to the Gnostics of Egypt, may be mentioned the schools of Carpocrates and his son Epiphaneus, the Antitacts, the Bortonians, the Phibionites, the Archontics, the Adamites, and the Prodicians. Hermodenes of Carthage is also by some regarded as a Gnostic teacher.—While the particular sect and schools of the Gnostics had disappeared almost wholly in the 6th century, their opinions survived to a much later age, seriously affecting not only the orthodox faith, but appearing in many of the famous and troublesome heresies. Their earlier influence is to be noticed in the views of the Ebionites and the Docetæ, in the speculations of the Clementine Homilies, in the radical theories of Montanism, in the fantasies of the New Platonists, and above all in the powerful and wide-spread Manichæan heresy. Some have also endeavored to find traces of Gnosticism in the Sabellian, Arian, and Pelagian heresies. In the 7th century their doctrines were repeated by the Paulicians, in the 9th by the Athingianians or "chil-

dren of the sun," about the close of the 11th by the Catharists, and in the 12th by the Bogomiles of Byzantium. Some of the opinions of the knights templars and of the Waldenses seemed to be borrowed from this source, and the reveries of Spanish and German mystics are not unlike the hymns of Bardesanes. The sources from which our knowledge of Gnosticism is drawn are the single Gnostic work *Pistis Sophia*, translated from Coptic into Latin by M. G. Schwartz (edited by J. H. Petermann, Berlin, 1851); Irenæus's *Ἐλεγχος τῆς ψευδωνύμου γνώσεως* (edited by Stieren, Leipsic, 1853); fragments from Irenæus and Hippolytus (edited by Emanuel Miller, Oxford, 1851); and the works of Ignatius, Justin, Tertullian, Clement of Alexandria, Origen, Eusebius, Philastrius, Epiphanius, Theodoret, Augustine, Plotinus, and others. The more important modern works which treat of Gnosticism are: Neander, *Genetische Entwicklung der vornehmsten gnostischen Systeme* (Berlin, 1818); E. A. Lewald, *De Doctrina Gnostica* (Heidelberg, 1818); Möhler, *Ursprung des Gnosticismus* (Tübingen, 1831); Baur, *Die christliche Gnosis, oder die christliche Religionsphilosophie in ihrer geschichtlichen Entwicklung* (Tübingen, 1835); Matter, *Histoire critique du gnosticisme* (2d ed., 3 vols., Paris, 1843-4); the church histories of Mosheim, Neander, Gieseler, Hase, and Schaff; Beausobre's "History of Manichæism," Münster's "Ecclesiastical Antiquities," Ritter's "History of Philosophy," Dorner's "Christology," and Bunsen's "Hippolytus and his Age."

GNU, a hollow-horned ruminating animal, inhabiting the plains of southern and central Africa, generally classed with the *bovidæ* or ox family, of the genus *catoblepas* (H. Smith) or *cornochetes* (Gray); the *wilde beast* of the Dutch colonists at the Cape. It is one of the most singular of animals, having the head and horns of a buffalo, the body and mane of a horse, and

in both sexes, above and behind the eyes, close together at their origin, descending at first downward and outward, then curving upward and backward, flattened at the base, cylindrical at the tip, rough and irregular. The hair on the brows and forehead is long and shaggy,



Brindled Gnu (*Catoblepas gorgon*).

giving a fierce expression to the face; the neck has a rigid mane above, and a long, hairy dewlap below; the shoulders are deep, and surmounted by a moderate hump; the body is rounded like that of a horse, and the limbs delicately formed; the tail is moderately long, with a brush at the end; the hair elsewhere on the body is short; the hoofs are rather large for the limbs, and the skin of the knees is bare and callous, from their habit of going on their knees in attack and defence. The general color of the common species (*C. gnu*, H. Smith) is yellowish tawny, darkest on the back and legs, with the tips of the long hair blackish. The gnu, though clumsy in appearance, is very swift and active, galloping over the plains like a horse, and feeding in large herds like wild cattle; when alarmed, it rarely takes to flight until it has examined into the cause of the danger, a curiosity of which the hunter is able to take advantage; it is very pugnacious, and is tamed with difficulty. The common species is about 3 ft. 10 in. high at the shoulders, and 6½ ft. long from nose to tail. A second and larger species is the *kookon* or brindled gnu, *blauwe wilde beast* (*C. taurina et gorgon*, H. Smith), which measures about 5 ft. at the shoulders and 7½ ft. from nose to tail, the tail 1½ ft., and the horns about 2 ft. long. The face is blackish, the sides of the head and neck yellowish gray, the latter and the shoulders with vertical dark stripes; the body above and the sides glossy reddish gray; below, and the limbs, reddish brown. Both species inhabit the extensive grassy plains of central



White Gnu (*Catoblepas gnu*).

the limbs of an antelope. The form of the head, neck, and shoulders is decidedly bovine, robust, and clumsy; the forehead wide and flat, the muzzle broad, and covered with hair except the valvular opening of the nostrils; the eyes large; ears long, narrow, and pointed; horns present

Africa, advancing southward after the summer rains to the Orange river, south of which only the common and first named species ranges. Great numbers are killed every year by the Cape colonists, but their annual visitations still continue; the flesh is considered excellent.

GOA. I. A Portuguese colony in India, on the W. coast, between lat. $14^{\circ} 54'$ and $15^{\circ} 45'$ N., and lon. $73^{\circ} 45'$ and $74^{\circ} 26'$ E., bounded N. by Sawuntwarree, E. by N. Canara, and W. and S. by the Indian ocean; pop. about 418,000. With the exception of Damaon and Diu, it is the only Portuguese possession in India. It is well watered and fertile, producing rice, pepper, coconuts, betel nuts, and salt. The inhabitants, two thirds of whom are Roman Catholics, are chiefly descendants of Europeans by native women. II. **Old Goa**, a city of the above named colony, and formerly capital of the Portuguese possessions in India, on an island separated from the mainland by the river Mandova, 250 m. S. S. E. of Bombay; pop. about 4,000. The houses are built of stone in the European style, the streets are regular, and the public buildings far surpass everything else erected by Europeans in India, but are falling to decay, and the ruins of the ancient edifices have been used as quarries for building materials in the new town. During the 16th century it was one of the most flourishing European settlements in the East; its walls described a circuit of 6 m., and enclosed a population of 150,000 Christians and 50,000 Mohammedans; but the site is unhealthy, and was abandoned early in the 18th century. St. Francis Xavier was buried there, March 15, 1554; but his remains, with his magnificent tomb, covered with sculptures representing passages in his life, have been removed to the new town. Old Goa is now nearly deserted; but some pains are taken to keep the ancient churches and public buildings in repair. III. **New Goa, Panjim, or Pangaam**, situated on the same island, 5 m. nearer to the sea than the old town, on a fine bay S. of a headland called Algoada point, with two lighthouses, is a fortified place, and since 1758 the Portuguese capital in the East; pop. about 24,000. It is the residence of the governor and principal Portuguese inhabitants, and the seat of an archbishop. The principal buildings are the cathedral, custom house, and the palaces of the archbishop and the governor. The trade, once the most important of any place in India, is now trifling, and is limited to the mother country and the Portuguese settlements on the coast of China and Africa. The revenue of the colony is about \$600,000 annually. Goa was taken from the Hindoos by the Mohammedan sovereign of the Deccan in 1469. In 1510 it was captured by the Portuguese, who made it the capital of their conquests in India; and it has ever since remained in their hands except during the period from 1807 to 1815, when it was held by the British. In no part of the world was the inquisition more vigorously maintained than in

Goa. A mutiny of the native troops took place here in November, 1871.

GOALPARA, or **N. E. Rungpoor**, a district of Bengal, British India, bounded N. by the native state of Bootan, E. by the district of Camroop, S. by Mymensing and the territory of the Garrow tribes, and W. by Rungpoor and Cooch Behar; area, 4,433 sq. m.; pop. in 1872, 442,761. It produces cotton, tobacco, sugar, and mustard. Though belonging properly to Bengal, of which it formed a part on the acquisition of that territory by the British in 1765, it is often regarded as a district of Assam, with which country it is naturally connected by similarity of climate, soil, &c.—The town of the same name, on the Brahmapootra, 280 m. N. E. of Calcutta, is the chief trading place of the region.

GOAT (*capra*, Linn.), a hollow-horned ruminant, of the subfamily *ovinae*, which also contains the sheep. The genus is characterized by a convex forehead, nose for the most part straight in its upper outline, and the absence of lachrymal sinuses and secreting glands between the hoofs; the horns, present in both sexes, but larger and more angular in the males, are of a dull yellowish brown color, compressed and nodose, with a sharp edge behind and before, curving backward, but not completing a circle, and the tips never coming forward; their curve, unlike those of the sheep, forms part of a circle, whose diameter is much longer than the head; their osseous nucleus is porous or cellular, communicating with the frontal sinuses; the chin is bearded, the tail very short and naked below, the hoofs as high on the inner as on the outer side, and the mammae, generally two, forming an udder; the nose is covered with hair, except a narrow naked space between the nostrils; the limbs are strong, with a callosity on the carpus. The dental formula is: incisors $\frac{3}{3}$; canines none; molars $\frac{3}{3}$; in all 32 teeth. The hair is never very coarse, and sometimes remarkably fine, with a woolly down underneath. The period of gestation is five months, and the number of young generally two; the female is capable of propagating at seven months, and the male at a year old; the age of the goat may be extended to 15 years, though they are generally old at 6. The males emit a powerful odor, and are libidinous and pugnacious. They ascend giddy heights, and spring with great precision from rock to rock where there seems hardly a possibility of their obtaining a foothold; their sight and smell are acute. The hunting of the wild species is both difficult and dangerous. The goats include the ibex of Europe, Asia, and Africa (see IBEX); the wild *agagrus*, and the Jemlah goat or the jharal. There is no goat indigenous to America, the so-called Rocky mountain goat being in reality an antelope.—The common wild goat (*C. [hircus] agagrus*, Pallas) inhabits the mountains of the Caucasus, Asia Minor, and Persia, and according to some the European Alps. It is higher on the legs than the domestic goat,

and the horns are large in proportion to the size of the animal. The general color is grayish brown above, with a dark dorsal line and blackish tail; the colors are paler in the female. Another wild species is the Jemlah goat (*C. Jemlahica*, H. Smith), with depressed, knobby,



Domestic Goat (*Capra hircus*).

wrinkled horns, a solid, heavy skull, and robust limbs; the hair on the neck and back is abundant, long, and loose, and on the sides of the head very coarse; the tail is very short; the color is a dirty whitish fawn. It inhabits the district of Jemlah, in the elevated mountain chain of central Asia. The *C. corsus* and *C. imberbis* (De Blainville) are believed to be domesticated varieties of this species. The jbaral of Hodgson is by Gray referred to the same species as the last, forming the genus *hemitragus* (Hodg.); they have four mammae. The domestic goat (*C. hircus*, Linn.) resembles the *C. agagrus* more than any other wild species. The common goat of the mountainous countries of Europe much resembles the *agagrus*, and has in some places become so wild as to be difficult of approach; the ears are small and upright; the size of the body is smaller, the hair coarser, the horns more vertical and turning outward, and the colors more varied. The Persian goat resembles a small *agagrus*; the hair is long and coarse. The Welsh breed is large, generally white, with long fine hair, and with vertical horns about 3 ft. long. There are small hornless breeds of goats in South America, the West Indies, and the Pacific islands, supposed to have originated from Africa. The Angora has long soft hair, mostly white, long ears, upright yellowish horns, and a sheep-like look. The famous Cashmere (properly Thibet) breed have long, straight, silky hair, large pendent ears, and slender legs. The Nepaul goat is black, of a high and slender figure, with an arched form of nose, and long, hanging,

whitish ears. The goat of upper Egypt is of a brownish color and high stature, with long shaggy hair, arched nose, ample pendent ears, and the upper jaw so much shorter than the under that the lower incisors and chin are exposed.—Goat skins were probably among the first materials used for clothing among the northern nations. The milk of the goat is used for making cheese, and is prescribed as a medicine in debilitated constitutions and pulmonary diseases. In the malarious regions of Asia cow's milk is regarded as a predisposing cause of bilious fevers and diseases of the liver, and goat's milk is therefore substituted. The flesh of the kid is esteemed as food; from the skin are made fine gloves, various garments, and the real Morocco leather; from the hair of one variety are manufactured the costly fabrics of Cashmere. (See CASHMERE).—The Rocky mountain goat is referred to the genus *capra* by Desmoulins, Harlan, Sundevall, Richardson, Bachman, and Van der Hoeven; but recent examinations go to show that in all its essential features and affinities it is an antelope, and belongs to the genus *aplocerus* (H. Smith). It resembles the goat and merino sheep in its figure and size; the horns are small, conical, smooth, nearly erect, and jet black. The outer hair is long, straight, and white, as fine and soft as that of the Cashmere goat; the chin is bearded; the external fleece hangs down all over the body and upper part of the legs; the under hairs are soft and silky like wool. It inhabits the highest and most inaccessible peaks of the Rocky mountains between the parallels of 40° and 65° N., and is most abundant in Washington territory; it is very difficult to procure; the mountain sheep



Rocky Mountain Goat (*Aplocerus montanus*).

(*ovis montana*, Cuv.), or big-horn, has been often mistaken for it by travellers.—The goats are rarely found fossil, and belong nearly to the same epoch of creation as man, forming probably the first step by their domestication in his progress toward civilization. The goat

was one of the signs of the ancient zodiac (Capricorn); the mythological Pan, the god of shepherds and the supreme power over nature, was represented with the horns and legs of a goat; the *agis*, or shield of Jupiter, was covered with the skin of a goat; this animal was sacred to several ancient divinities, and even under the Jewish dispensation was emblematical of atonement.

GOATSUCKER, a nocturnal fissirostral bird, of the order *passeres* or *insectivores*, suborder *strisores*, and the family *caprimulgidae*. The family are characterized by a short, very broad, depressed bill, with an immense gape extending beneath the eyes and rendered larger by numerous bristles for arresting their insect prey; the eyes are very large, and easily dazzled by the full light of day; the tarsi are short and weak, the toes long, the hind toe closely united to the base of the inner; the plumage is soft, enabling them to fly without noise. In the sombre colors and texture of the feathers, in the large head and eyes and nocturnal habits, they resemble the owls, but zoologically they come nearest to the swift family. The name goatsucker is derived from the Latinized Greek appellation *caprimulgus*, which originated in the idea that they suck the mammae of goats; the French call these birds *engoulevents*, or wind swallows, and *crapauds volants*, or flying toads, probably on account of the great capacity of the mouth. Like the owls, they hide themselves by day, coming out toward sunset, and pursuing insects on the wing with great rapidity during the twilight; they make no nests, but deposit their eggs on the bare ground or in slight concavities; they are found in all parts of the world, but most abundantly in South America. There are three subfamilies: *steatorniina*, or oil birds, found in the West and East Indies, Australia, Africa, and South America; *caprimulgina*, alone represented in the United States; and *podagerina*, in Africa and South America. In the first subfamily the genus *steatornis* (Humboldt) become so plump on the rich palm fruits of Guadeloupe and Trinidad in the breeding season that their fat is compared to that of olive oil, and as such is permitted to be used during Lent. Some species of the genus *nyctibius* (Vieill.) are as large as a short-eared owl. Among the *caprimulgina* are included the European goatsucker, the North American chuckwill's widow, whip-poorwill, and night hawk, and the South American scissors-tailed goatsucker. The European species (*caprimulgus Europæus*, Linn.) is as large as a thrush, of a gray brown color, undulated and spotted with blackish brown, with a band of white from the bill to the nape; it nestles in the furze, and lays two eggs. From the nature of its food and its method of taking it, and its manner of flying, it is often called the square-tailed swallow; it feeds on nocturnal insects like moths and beetles, and migrates during winter into southern Europe and northern Africa. The chuckwill's widow (*antrostomus*

mus Carolinensis, Gould) is the largest of the North American species, being about 13 in. long, with an extent of wings of 26 in.; it has very strong bristles at the base of the bill, each with lateral filaments; the wings are long, and the tail slightly rounded; the prevailing color



Chuckwill's Widow (*Antrostomus Carolinensis*).

is pale rufous, the top of the head reddish brown with longitudinal black streaks, the last two thirds of the tail feathers (except the four central) rufous white, with the outer webs of all mottled; the female has no white patch on the tail; it is found in the southern Atlantic and gulf states. The popular name of the bird is derived from the sounds which it utters very clearly and strongly six or seven times in quick succession in a melancholy tone; they are sel-



Leona Goatsucker (*Macrodipteryx longipennis*).

dom heard in cloudy weather, and never, according to Audubon, when it rains. The flight is rapid, graceful, and elevated. It makes its appearance from the south in the gulf states about the middle of March; no nest is made, but the eggs are laid among the dead leaves;

if the eggs be disturbed, the birds remove them in their mouths (according to Audubon, who witnessed the fact), and place them in another locality; they probably remove the young in the same manner. They manifest a great antipathy to all kinds of snakes. They leave the United States about the middle of August. The whippoorwill (*A. vociferus*, Wils.) and the night hawk (*chordeiles Virginianus*, Briss.) will be described under their proper titles. The scissors-tailed species (*C. furcifer*, Vieill.) of Paraguay is remarkable for the length of the outer feathers of the tail, gradually diminishing to the tip. Among the *podagerinae* is the Leona goatsucker (*macrodipteryx longipennis*, Shaw), a native of Africa, having the innermost quill of the wings extremely prolonged and deficient in webs except at the end, and longer than the bird itself. The genus *podager* (Wagl.) has long wings and short even tail, and short and feathered tarsi; it is found in the warmer parts of South America, frequenting fields and moist places, usually in pairs, but occasionally in large flocks, chasing insects in the full light of day; it lays two eggs on the bare ground. Most of the goatsuckers have the inner edge of the middle claw pectinated, like a comb, for the purpose of cleansing the bristles of the bill from remains of insects and particles of dirt.

GOBELINS, Manufactory of the, an establishment in Paris belonging to the French government, devoted to the production of tapestry and carpets. It is situated in the faubourg St. Marcel, upon the Bièvre, being No. 254 rue Mouffetard. It derives its name from the brothers Jehan and Gilles Gobelin, who discovered an improvement in scarlet dye, and erected this building as they believed that the water of the little stream Bièvre possessed qualities advantageous to their art. Jehan, the head of the Gobelin family, died in 1476; some maintain that he was a native of Rheims, and others that he came from Holland. His scarlet dye soon rose into great repute. The establishment was purchased by Louis XIV., and transformed in 1667 into the *manufacture royale des meubles de la couronne*. The royal factory was not only a dye house and a manufactory of tapestry, but an immense workshop in which everything was executed that was needed for furnishing and decorating houses. Engravers in metal and gold and silversmiths produced chandeliers, torch-holders, candlesticks, and statuary bronzes, in keeping with the magnificent tapestry designs, which skilful weavers wrought after patterns furnished by the royal painters; cabinet makers carved, turned, and gilded the wood of the furniture; Florentine artists inlaid beautiful mosaics; and thus everything, even the knobs and locks of windows and doors, was executed in the highest style of art. The royal painter, Lebrun, was the director of this immense establishment. Mignard, who succeeded Lebrun, opened in it a school of design. Though the works were ready to execute private orders, their prosper-

ity was chiefly dependent on the patronage of Louis XIV.; and when, on account of the pecuniary embarrassments of the crown after the year 1694, this patronage was withdrawn, all the skilled workmen had to be dismissed. After the peace of Ryswick (1697) the Gobelins was opened again, but the operations were restricted to the manufacture of tapestry, which was generally made only for presentation to crowned heads and persons of distinction. The revolution threw the establishment into neglect, and Napoleon gave it little encouragement; but the Bourbons, who returned to the old custom of making gifts with the celebrated tapestry, brought it again into a flourishing condition, in which it remained, with slight interruptions, till it was partly burned by the communists, May 24, 1871.—The manufactory of the Gobelins is now divided into three distinct sections: the dye house, the tapestry workshop, and the carpet factory. The dye house produces not only all different colors, but from 20 to 30 shades of each. While many of the hangings worked 50 years ago are already faded, the factory is now able to produce any color perfectly fast. This great progress is due to the labors of the eminent chemist Chevreul, who was employed by the government to instruct the Gobelins dyers. Large rooms are devoted to the *hautes lisses*, or high warps, upon which the tapestries are suspended as the work goes on. The warp hangs from a horizontal cylinder, and as every yard or thereabout in length is completed, it is wound upon another cylinder in the lower part of the frame. The principal features of the design being traced with white chalk by the artist upon the stretched thread of the warp, he marks, with the aid of tracings from the picture, which he attaches to the warp, the exact positions of the light and dark shades. Then, with the pattern conveniently placed for reference, the artist stations himself against the back of the tapestry, and, with his worsteds and silks at hand, begins to work in the different colors. The vertical threads of the warp are divided by a heddle or cross stick which keeps half of them in advance of the rest; but those behind can be brought forward whenever required by means of small cords, one of which is attached to each warp thread. The left hand is introduced between the two sets of threads, taking up as many as need be, and through these the needle is passed from left to right. The thread when stretched is piled with the point of the needle, and is then passed back in the contrary direction through the space opened by shifting the position of the front and back threads. By ingeniously combining the woofs, the colors are made to blend perfectly, and effects are obtained like those of painting. The work is so slowly executed that an artist is not expected to average in a year a production of more than about 39 inches square.—In 1826 the manufactory of carpets, called *la savonnerie*, from an old soap factory in which the making

of carpets had been carried on from the year 1615, was connected with the tapestry establishment. The carpets are remarkable for smoothness and evenness of texture and their strength and fineness, excelling even the Persian in these respects. Some of them require from five to ten years for their completion, and cost 60,000 to 150,000 francs. All the carpets made during the reign of Napoleon III. were used for the decoration of the imperial palaces. The largest ever made was manufactured for the gallery of the Louvre. It consists of 72 pieces, the total length being more than 1,300 ft.—Among the celebrated pieces executed at this establishment is a picture, completed about the year 1844, of the "Massacre of the Mamelukes," after the celebrated work of Horace Vernet, which has been presented to the queen of England. The portrait of Louis XIV., by Rigaud, is considered the finest work of the Gobelins. Titian's "Assumption" was worked after a copy by Serrur into a magnificent tapestry 21 ft. high.

GOBERT, Napoleon, baron, a French philanthropist, born in 1807, died in Cairo, Egypt, in 1833. He was the son of a general, and godson of Napoleon. He served in the army without distinction. By his will the French academy and the academy of inscriptions were made his residuary legatees, on condition that the former should award nine tenths of the income of its share of the legacy as a prize to the author of the most eloquent work on French history that had appeared during the year preceding the distribution, and one tenth to the next in merit; and that the academy of inscriptions should award similar prizes to the authors of the first and second most learned and profound works on the history of France; this income to be paid annually to the recipients until better works of the same kind should appear. The heirs unsuccessfully contested the bequest, but the academies compounded with them, and secured an income of 10,000 francs each, which has since 1840 been disposed of in accordance with the will.

Gobi (Mongol, a desert), an immense tract of country in central Asia, occupying mainly the table land between the Altai mountains on the north and the Kuenlun on the south, between lat. 37° and 50° N., and lon. 80° and 120° E. It is about 1,800 m. long, with an average breadth of nearly 350 m., though in some parts it is much greater; area, about 600,000 sq. m. It is divided into two nearly equal parts, the western being comprehended in Turkistan, the eastern in Mongolia, a small part being in the Chinese province of Kansu, and reaching to the Chinese wall. Of the western part little is known; the surface consists mainly of fine loose sand, which is drifted about by the winds, and sand storms are of frequent occurrence. It is drained by the Yarkand or Daria, which falls into Lake Lob; this lake has no outlet, and is consequently brackish. Similar salt lakes are numerous

throughout the desert; and upon these and the rivers which flow into them the Tartars pitch their tents and raise their cattle. The eastern part is somewhat better known; there are a few fertile valleys and some towns; but a large part, called by the Chinese Shamo, or the Sand sea, is a plain 2,500 to 3,000 ft. above the sea, covered with gravel and small stones. Pasturage is the usual occupation of the Mongolians, who lead a nomadic life in the mountain fringes of E. Gobi. It is drained toward the east by the head waters of the Amoor, which falls into the sea of Okhotsk, and toward the north by the Selenga, which, bursting through the Altai range, falls into Lake Baikal. The climate of the entire desert is intensely cold during the winter, which lasts nine months.—See Atkinson's "Explorations in Siberia, Mongolia," &c. (1857).

Goby, a spiny-rayed fish, of the genus *Gobius* (Linn.), found on the rocky and sandy coasts of the old world. The black goby (*G. niger*, Linn.), the largest on the British coasts, is about 6 in. long; it has two dorsal fins, and the ventrals are united below the throat into a sucking disk by which it can attach itself to the rocks,



Goby (*Gobius niger*).

to which it retires to devour its living prey. Gobies, like the allied blennies, are very tenacious of life, and will live a considerable time out of the water. It was known to the ancients that the goby of the Mediterranean built in the spring a nest, well made of seaweeds, in which the female deposited her eggs, guarded by the male until they were hatched; other species make a similar nest. Gobies are sometimes found in very deep water.

GODAVERY, a large river of British India, rising in the Western Ghats, about 60 m. from the Indian ocean, lat. 19° 58' N., lon. 73° 30' E., and, after a S. E. course of 900 m. across the peninsula, flowing into the bay of Bengal by two principal channels. It receives in its course the Manjera from the south, and the Poorna and Wurdah from the north. After the junction of the Wurdah it is a mile wide, and after passing through the mountainous region it becomes 4 m. wide. The delta commences at Pechakalunka, in lat. 16° 57' N., lon. 81° 49' E., and contains an area of 500 sq. m. The banks of the river on each side are marked by ridges a few feet high, formed by deposits during the inundation. From Coringa, at its principal mouth, the navigation was until recently

practicable only for vessels drawing not more than 3 ft., and at Sinteral, about 140 m. up the river, were several barriers. A dam now stretches across the Godavery above one of these barriers, nearly a mile long, and from 10 to 12 ft. wide. A canal is thus formed about 26 m. long, which is provided with double locks 200 ft. long and 25 ft. wide. At Enchapully is a barrier of rocks, and the river becomes very tortuous; here another dam has been formed of loose stones, 3,600 ft. long and 12 to 24 ft. high, and a canal was made to connect it with the lower level. By these means the river is open for navigation up to the Wurdah, which can be ascended near to the cotton mart of Umrawutty. The completion of these works has given a strong impulse to the progress of the country. As early as 1846 the East India company began their construction, but the outbreak of the mutiny in 1857 checked the work for a long time. In 1863 the work was resumed, and the river, formerly navigable only for small craft and during the rainy season, now carries large ships and steamboats far inland.

GODDARD, Arabella, an English pianist, born at St. Servan, near St. Malo, Brittany, in January, 1836. She very early manifested great musical talent, and was instructed on the piano by Kalkbrenner in Paris, and, after the removal of her parents to London in 1848, by Mrs. Anderson, pianist to the queen, and Thalberg. Her first public appearance was at a concert in her father's residence, March 30, 1850; and in October she played at the grand national concerts, becoming known as a brilliant performer of the music of Thalberg and the modern romantic school. Subsequently she studied harmony with Macfarren, and has played more classical music. In 1854-'6 she gave concerts in the principal cities of France, Germany, and Italy. In 1860 she was married to Mr. Davison, a musical critic, but still retains professionally her maiden name. In 1872 she visited the United States and played at the great musical festival in Boston.

GODERICH, a town, port of entry, and the capital of Huron co., Ontario, Canada, on the E. shore of Lake Huron, at the mouth of the Maitland river, and at the terminus of the Buffalo and Goderich branch of the Grand Trunk railway, 118 m. W. of Toronto; pop. in 1871, 3,954. The surrounding country is fertile and picturesque, and the town is much frequented in summer for the cool air from the lake. It has a good harbor, protected by a pier, and is furnished with a lighthouse. Daily lines of steamers run to Sarnia, Detroit, and ports on the lake. The fisheries are valuable. The town is celebrated for its salt wells, of which eight are in operation. It also contains a large grain elevator, manufactories of woollens, iron castings, machinery, leather, boots and shoes, wooden ware, &c., several saw and grist mills, two branch banks, two weekly newspapers, and churches of four denominations.

GODERICH, Viscount. See RIXON, earl of.

GODFREY, Thomas, an American mathematician, born in Philadelphia, died in December, 1749. He had but a common education, and followed the business of a glazier in his native city; but he mastered all the books on mathematics that he could obtain, and learned Latin to read mathematical works in that language. He borrowed a copy of Newton's *Principia* from James Logan, secretary of the commonwealth, and in 1730 communicated to him an improvement that he had made in Davis's quadrant. In 1732 Logan gave an account of the invention to Edmund Hadley of England, and Godfrey also prepared a description of it addressed to the royal society of London, but did not send it, awaiting the effect of the letter to Hadley. No answer was received after an interval of a year and a half, and then the invention of Godfrey was laid before the royal society by the botanist Peter Collinson. Meantime, in 1731, Mr. Hadley had presented a paper containing a full description of an improvement of the quadrant similar to that of Godfrey. The rival claims were investigated by the royal society, and it was decided that they were both entitled to the honor of the invention, and a reward of £200 was bestowed on Godfrey, in household furniture instead of money, on account of his intemperate habits. Godfrey's or Hadley's quadrant is the same in principle and application as the sextant.

GODFREY OF BOULLON. See BOULLON.

GODIVA. See COVENTRY.

GODKIN, Edward Laurence, an American journalist, born at Moyné, county Wicklow, Ireland, Oct. 2, 1831. He was educated at Queen's college, Belfast, and during the Crimean war (1854-'6) was correspondent in Turkey and Russia of the London "Daily News." In 1856 he came to the United States, and made a journey on horseback through the southern states, which he described in a series of letters to the "Daily News." He then studied law in New York, and was admitted to the bar in 1858, but has never practised. In 1862 he was again employed as correspondent of the "Daily News," and was also a writer of leading articles for the "New York Times." In July, 1865, he became editor of "The Nation," and since 1866 has also been its proprietor.

GODMAN, John D., an American naturalist, born in Annapolis, Md., Dec. 20, 1794, died in Germantown, Pa., April 17, 1830. He was apprenticed to a printer in Baltimore, but at the age of 20 enlisted in the navy and was present at the defence of Fort Mchenry. After the war he studied medicine, and practised till 1821, when he became professor in the medical college of Ohio at Cincinnati, and commenced there the "Western Quarterly Reporter." In 1822 he removed to Philadelphia and devoted himself to the science of anatomy, of which in 1826 he became professor in Rutgers medical school, New York; but he soon resigned and went to the West Indies for his health, and on his return settled in German-

town. He prepared the zoölogical articles for the "Encyclopædia Americana" as far as the end of the letter C, and contributed to various scientific periodicals. His principal work is his "American Natural History" (3 vols. 8vo, Philadelphia, 1823-'8), besides which he published an "Account of some Irregularities of Structure and Morbid Anatomy," "Bell's Anatomy," with notes, "Anatomical Investigations," and "Rambles of a Naturalist."

GODOLPHIN, Sidney, earl of, an English statesman, born in Cornwall about 1635, died Sept. 5, 1712. Soon after the restoration of the monarchy he was made one of the grooms of the bedchamber to Charles II., was elected member of parliament in 1661, and became privy councillor in 1679. He voted for the exclusion of the duke of York from the throne in 1680, was made first commissioner of the treasury in 1684, and after the accession of James II. was retained in office as chamberlain to the queen, and became one of the chief royal advisers. He took office under William III., having become an almost indispensable part of the machinery of state, was placed at the head of the treasury, and on the accession of Queen Anne in 1702 was created lord high treasurer, being the first person who had held that office since the revolution. He was, however, led by Marlborough to doubt the stability of the government created by the revolution, and he served it for six years while at the same time sending professions of attachment and promises of service to James. In 1706 he was created Viscount Rialton and earl of Godolphin, attached himself to the whig party, and the final result of his struggle with Harley for the premiership was his sudden and rude dismissal from office in 1710. Godolphin was the most prudent and experienced of the financiers of his time. "Every government, therefore," says Macaulay, "found him a useful servant; and there was nothing in his opinions or in his character to prevent him from serving any government." He was a keen gambler and horse racer.

GODOY, Manuel de, a Spanish statesman, born in Badajoz, May 12, 1767, died in Paris in October, 1851. Descended from an old and noble family, yet poor, he went to Madrid at the age of 17 to seek his fortune. He entered the military service, and his handsome figure, amiable character, and elegant manners soon attracted the notice first of the ladies of the court, then of the queen, and next of the king. His talent for intrigue gained him rapid advancement, and he was successively created duke of Alcudia, generalissimo of the land forces, grand admiral of Spain and of the Indies, secretary of state, prime minister to succeed Aranda in 1792, knight of the golden fleece, and a grandee of Spain of the first class. When Louis XVI. was brought to trial by the convention, Godoy declared war against France; but by the treaty of Basel in 1795 Spain formed an alliance with the republic. For this service Charles IV. gave

him the title of "prince of the peace," and a domain which yielded him a large revenue. In 1797 he married Maria Theresa de Bourbon, niece of the king, although it is alleged that he was already secretly married to Josephine Tudo, the daughter of a military officer. Obligated in 1798 to resign his power for a time, he resumed it in 1801, when he signed the treaty of Badajoz, which proposed to partition Portugal between France and Spain, and which by a secret article gave to himself more than \$3,000,000. During his ministry the Spanish possession of Louisiana was transferred to France. In the height of his power, however, he incurred the enmity of the nobles by his preponderance in the government, of the priests by his opposition to the inquisition, and of the people, who attributed to him all the political evils they endured; and soon a strong party was formed against him under the patronage of the prince of Asturias, afterward Ferdinand VII. When Napoleon determined upon the dethronement of the Bourbons of Spain, and at the same time a criminal suit instigated by the prince of Asturias was pending against Godoy, the latter advised the royal family to take refuge in America. This project was not matured when an insurrection broke out against Godoy, who was seized by the populace in his hotel, and his life having been with difficulty saved, he was held prisoner to await the course of justice. Napoleon however, who wished to avail himself of his influence over Charles IV. to secure the renunciation of the crown of Spain by that monarch, obtained his freedom, and invited him to the conferences of Bayonne (1808). Godoy drew up the act of abdication signed by the king, whom he then accompanied in his exile to Rome; and his immense possessions in Spain were confiscated. Godoy lived in Paris after the death of Charles IV., and received a pension of 5,000 francs from Louis Philippe, although in 1842 he was reinstated in his dignities in Spain. His "Memoirs," of which he was only nominally the author, appeared in Madrid, Paris, and London in 1836.

GODUNOFF, Boris Fedorovitch, a czar of Russia, born in 1552, died in 1605. He was a brother-in-law of the czar Feodor I., whose infirmities of body and mind enabled Godunoff to obtain complete control of the government. He aspired to the throne, and had most of his rivals put to death or exiled. Among his victims was Demetrius, the younger brother of Feodor and heir to the crown, who was banished to Uglitch, where he died by violence in 1591. On the death of Feodor, in 1598, Godunoff succeeded to the throne, mainly through the aid of the patriarch of Moscow, the head of the national church. He sought to distinguish his reign by various reforms and by promoting education, and to dazzle the people by magnificent monuments. Great disaffection arose in the empire, and in 1604 a pretender claiming to be Demetrius appeared from Poland at the head of a consider-

able army. He won a battle at Novgorod, but was signally defeated at Dobrynitché. (See DEMETRIUS.) At this juncture Godunoff suddenly died, and his death was popularly ascribed to poison administered by himself. His son and successor, Feodor, perished soon after. Russian historians generally consider Godunoff as a usurper; but the house of Romanoff regard him as a legitimate sovereign.

GODWIN, earl of Wessex, a Saxon noble, born about the end of the 10th century, died in April, 1053. He was a cowherd, but having ingratiated himself with Ulfr, the brother-in-law of King Canute, he received in marriage the daughter of that chieftain, and became the most powerful nobleman in England. In the interest of Harold Harefoot he was believed to have procured the murder of Prince Alfred; but he was pardoned both by Hardicanute and Edward the Confessor, Alfred's brothers, and exerted himself to secure the crown for the latter. He afterward rebelled against Edward, by refusing to punish arbitrarily the men of Dover for the riot against Earl Eustace, and was obliged to flee the kingdom; but returning with a body of troops, he compelled the king to restore his possessions and dignities. Within a year after his restoration Godwin died. The Norman historians relate that he stood up at the king's banquet to aver his innocence of the death of Alfred, but fell speechless to the earth, and died soon after. He was the father of Harold, the last Saxon king.

GODWIN, George, an English architect and author, born at Brompton, Middlesex, Jan. 28, 1815. He was instrumental in founding the London art union in 1836-'7, of which in 1839 he was made chief honorary secretary; and to the "Art Union Magazine," now the "Art Journal," he became a constant contributor after its establishment in 1839. In 1844, having previously published "The Churches of London," he became editor of the "Builder." His chief architectural works are St. Mary's church, West Brompton, and the restoration of the church of St. Mary Redcliff, Bristol. He has published "Churches of London" (1838), "Facts and Fancies" (1844), "History in Ruins" (1853), "London Shadows" (1854), "Buildings and Monuments," "Town Swamps and London Bridges" (1859), "Memorials for Workers," and "Another Blow for Life" (1864). He has also written several dramas.

GODWIN, Parke, an American journalist, born in Paterson, N. J., Feb. 25, 1816. He graduated at Princeton college in 1834, studied law, and was admitted to the bar in Kentucky, but did not practise. From 1837 to 1843 he was an editorial contributor to the New York "Evening Post," edited by his father-in-law, William Cullen Bryant; and in February, 1843, he began a literary and political weekly journal, "The Pathfinder," which he continued three months, when he resumed his connection with the "Evening Post." In February, 1843, he advocated free trade in a public de-

bate in New York with Horace Greeley and others. In 1844 he published "A Popular View of the Doctrines of Charles Fourier," and a treatise on Fourier's ideas of industrial association, entitled "Democracy, Pacific and Constructive." In 1845 he was appointed a deputy collector in the New York custom house. For some years he was a frequent contributor to the "Democratic Review," several of his papers advocating important reforms which were subsequently carried out in the revision of the constitution and code of the state of New York. In 1852 he made an extended tour in Europe. In 1853 he became one of the editors of "Putnam's Monthly Magazine," to both the first and second series of which (1853-'7 and 1867-'70) he was a frequent contributor; and two collections of his articles have been reprinted in volumes, "Political Essays" (12mo, 1856), and "Out of the Past," critical and literary papers (1870). In 1860 he published the first volume of a "History of France," embracing ancient Gaul, and terminating with the era of Charlemagne. Since 1860 Mr. Godwin has made two protracted visits to Europe, during which he prosecuted his researches in French history. In addition to the publications above enumerated, he has written "Vala, a Mythological Tale," founded upon incidents in the life of Jenny Lind (1851); translated a part of Goethe's autobiography and a volume of Zschokke's tales, and compiled a "Handbook of Universal Biography" (1851; new ed., "Cyclopædia of Biography," 1865). He is now (1874) preparing "The History and Organization of Labor," a volume on "The Nineteenth Century, with its Leading Men and Movements," and "A Winter Harvest," a book of European travels. Until recently he was managing editor of the "Evening Post."

GODWIN, I. William, an English author, born at Wisbeach, Cambridgeshire, March 3, 1756, died in London, April 7, 1836. He was the son of a dissenting clergyman, was educated in the dissenting college at Hoxton, and in 1778 became minister of a congregation at Stowmarket, Suffolk. At the end of five years the incompatibility of this occupation with the new moral and political theories he had begun to entertain induced him to sever his connection with the ministry, and going to London he thenceforth devoted himself to literature. He soon began to promulgate doctrines which, if carried out, would have subverted the whole structure of society. Having already acquired some reputation by his "Sketches of History" (London, 1784) and contributions to the "Annual Register," of which he was at one time the principal conductor, he published the "Inquiry concerning Political Justice, and its Influence on General Virtue and Happiness" (2 vols. 4to, 1793), in which an intellectual republic, founded upon universal benevolence, is advocated with persuasive eloquence. In 1794 he appeared in the political arena as the champion of Horne Tooke, Thelwall, Hardy, and

others, who had been brought to trial on a charge of treason. In the same year appeared his most remarkable work, "Caleb Williams," a novel designed to illustrate some of the peculiar views put forth in the "Inquiry concerning Political Justice;" but the interest of the story is so predominant that the social object of the author was entirely overlooked. In 1796 he made the acquaintance of Mary Wollstonecraft, author of the "Vindication of the Rights of Woman," and, in accordance with the views held by both of them respecting marriage, cohabited with her for six months, when for prudential reasons they were married. His wife died after giving birth to a daughter, who became the second wife of the poet Shelley. His "Memoirs of the Author of the Vindication of the Rights of Woman" (1798) is a feeling tribute to her memory, but describes the details of her life with a minuteness which subjected him to considerable censure. In 1799 appeared "St. Leon," containing many incredible situations, but also many passages of splendid description and true pathos; it purports to be the autobiography of a philosopher who has become immortal by the discovery of the elixir of life. On this and "Caleb Williams" his reputation chiefly rests. His other novels are "Fleetwood" (1805), "Mandeville" (1817), "Cloudesley" (1830), and "Deloraine" (1833). Among his other works were the tragedies "Antonio" (1800), and "Faulkner" (1807-'8); a "Life of Chaucer" (2 vols. 4to, 1803); "Lives of John and Edward Phillips, Nephews of Milton" (4to, 1815); and a "History of the Commonwealth" (4 vols. 8vo, 1824-'8), written with great impartiality, and valuable as a repository of facts. His last important work, "Thoughts on Man, his Nature, Productions, and Discoveries" (1831), was a series of essays in the style of his earlier writings. A posthumous work by him, "The Genius of Christianity Unveiled," was published in 1873. For some years he carried on business as a bookseller, and under the name of Edward Baldwin published a number of children's books, small histories, and other compilations, some of which were by himself. In the latter part of his life he obtained a clerkship in the record office. His "Autobiography, Memoirs, and Correspondence" was published in 1874. **II. Mary Wollstonecraft**, an English authoress, wife of the preceding, born in Beverley, Yorkshire, April 27, 1759, died in London, Sept. 10, 1797. Her father, a man of ungovernable temper, embittered her childhood by the cruelty with which he treated his family. A natural independence of character induced her to sever herself from such a parent, and upon the death of her mother she established a school at Islington, in the direction of which she was assisted by two of her sisters. The illness of a friend in Lisbon called her thither for a while, and upon her return to England she found her school ruined by mismanagement. After a short experience as a governess in the family of Lord Kingsborough,

she determined to devote herself to a literary life. Having acquired considerable reputation by her "Thoughts on the Education of Daughters," and some works of fiction, as also by translations of Lavater's "Physiognomy" and Salzmann's "Elements of Morality," she ventured in 1791 upon a reply to Burke's "Reflections on the French Revolution," and soon after published her celebrated "Vindication of the Rights of Woman" (1791), in which the claim of woman to share with man the functions he has exclusively exercised is argued with boldness and ability. Full of enthusiasm for the new ideas which the French revolution had inaugurated, she went to Paris, only to find her hopes crushed by the overthrow of the Girondists. She here also formed a connection with an American named Imlay, who deserted her. Giving birth to a child, she endeavored to put an end to her existence, and afterward sought relief from her troubles in writing her "Letters from Sweden, Norway, and Denmark" (1796), which she had visited while she had her home in Paris. In 1797 she was married to William Godwin, and she died in childbirth. Her posthumous works were published by her husband (4 vols. 12mo, 1798).

GODWIT, a bird belonging to the *scelopacidae*, or snipe family, and subfamily *limosinae*, which includes also the curlew. It forms the genus *limosa* (Briss.), characterized by a long slender bill, inclined a little upward and slightly thickened at the tip, with sides compressed and grooved on both mandibles for nearly the whole length; the upper mandible a little the longer, and the gape moderate; wings long and pointed, the first quill the longest; tail short and even; tarsi slender, longer than the middle toe; toes long, the outer united to the middle by a membrane as far as the first joint; hind toe partly resting on the ground; claws short and obtuse. The shape is more slender and the bill and legs longer than those of the snipes. They are shy birds, frequenting the seashore, living chiefly on worms which they draw from the mud; they are found in most parts of the world, though most abundantly in cold climates, and their habits and manners are like those of the curlew; the flesh is excellent eating. The marbled godwit of the United States (*L. fedoa*, Linn.) is, in the female, about 20 in. long to the end of the tail, the bill $4\frac{1}{2}$, tarsus 3, and wing 9 in.; the male is somewhat smaller. The general color above is brownish black variegated with pale reddish, the former in bands and the latter in spots; below pale rufous, with transverse brownish black lines on the breast and sides; primaries dark brown on their outer webs, light rufous on the inner; tail light rufous, with brownish black bars; bill dark at the end, dull flesh color toward the base. It is found over the temperate regions of North America, and in South America; it is abundant in Florida during the winter, going to the north to breed in spring, and returning about the last of Au-

gust within the limits of the United States. It is a shore bird, rarely seen many miles inland; when feeding it probes the mud with its long bill, plunging it in often for its whole length, in search of marine worms and small crustaceans. Its flight is quick and regular, in long and fre-



Marbled Godwit (*Limosa fedoa*).

quently changing lines.—The Hudsonian godwit, a smaller and much rarer American species (*L. Hudsonica*, Lath.), is about 15 in. long, with an extent of wings of 28 in., tail 3, bill a little over 3, and tarsus $2\frac{1}{2}$ in.; weight about 9 oz. In the adults, the prevailing color above is brownish black, with spots and transverse bars of pale reddish; upper tail coverts white; beneath, yellowish red, with transverse bars of brownish black, and sometimes the feathers tipped with white on the abdomen; tail black, white at the base and tipped with the same; under wing coverts black; shafts of primaries white. The young are cinereous above, with irregular brownish black marks, dull yellowish



Hudsonian Godwit (*Limosa Hudsonica*).

white below, upper tail coverts white, tail as in adult. It is abundant in the northern parts of this continent, but rare in the United States, and scarcely seen south of New Jersey except in winter; it breeds in the far north; the females are somewhat larger than the males.—

The common godwit of Europe (*L. Lapponica*, Linn.), in its winter plumage, is deep brownish gray, the feathers edged with whitish; the breast brown gray, whitish underneath; rump white, radiated with brown; in summer the prevailing color is reddish.

GOENTOEK, a volcano of Java, about 100 m. S. E. of Batavia, nearly 7,000 ft. high. It is active, and produces considerable damage by periodical eruptions, four of which (1818-'41) were especially violent, destroying a vast number of coffee trees, and covering large tracts with heaps of stones, ashes, and sand.

GOERTZ. See GÖRTZ.

GOES, a town of Holland, on the island of S. Beveland, 15 m. W. of Bergen-op-Zoom; pop. in 1867, 6,313. It is surrounded by walls, and contains a number of squares, of which the Groote Markt, the largest, is planted with trees. The public buildings are the town hall, a Roman Catholic and a Protestant church, a new corn exchange, and many schools and charitable institutions. Both the old and new harbors are defended by forts, and there is an active commerce.

GOES, Hugo van der, a Flemish painter, pupil and successor of Van Eyck, flourished in the second half of the 15th century. His paintings are all of religious subjects, and their chief excellence is the grace and dignity of the countenances. His masterpiece is a "Crucifixion" in the church of St. James at Bruges. This picture was preserved from the general destruction of church ornaments in the 16th century by being coated with dark clay on which the ten commandments were inscribed.

GOETHE, Johann Wolfgang von, a German author, born in Frankfort-on-the-Main, Aug. 28, 1749, died in Weimar, March 22, 1832. His father, Johann Kaspar Goethe, the son of a tailor of Frankfort, had raised himself to the dignity of an imperial councillor, and in 1748 had married Katharina Elisabeth, daughter of Johann Wolfgang Textor, the chief magistrate of the city. Their first offspring, the subject of this article, inherited the best qualities of both parents. The father, a cold, stern, formal, and pedantic man, was a person of vigorous mind and of rigid will; and the mother was a simple-hearted, genial, vivacious, and affectionate woman, who loved poetry and the romantic lore of the nursery. In one of his poems Goethe afterward said: "From my father I derive my frame and the steady guidance of my life, and from my dear little mother my happy disposition and love of story-telling." But he derived a great deal more from both; for the father, rigid disciplinarian as he was, early indoctrinated him in the knowledge of the classics and modern languages, and in the love of fine art; while the mother gave him, besides her vivacity and animal spirits, that large and instinctive wisdom which comes of broad human sympathies. Goethe was a precocious child, handsome, lively, and sensitive. His early education was wholly domestic, in the

company of his only sister Cornelia, to whom he was passionately attached. Before he was ten years of age he wrote several languages, meditated poems, invented stories, and had a considerable familiarity with works of art. Frankfort was a mediæval city, full of old associations and the remains of antique customs, but just beginning to stir with the quick movements of a more modern trade and industry. None of its influences, old or new, were lost upon the child, whose position in middle life, while it brought him in contact with the most cultivated men of society, did not exempt him from occasional mixture with the lower orders, or from the ruder experiences of life. His first love for Gretchen, a girl in the humblest ranks, began amid a circle of forgers and delinquents. In October, 1765, at the age of 16, he was sent to Leipsic to begin his collegiate studies. His autobiography passes over this part of his life with a few words, but other evidences show that it was a time not of hard and varied study merely, but of much wild and frolicsome adventure. While he mastered with an easy grace the manifold sciences and arts of a German university, jurisprudence, medicine, logic, rhetoric, philosophy, morals, drawing, &c., he was no less at home in those wayward and capricious sports, in the love-makings and the merry-makings, which are natural to this period of life. No criminal indulgences are charged upon him, but he lived freely and buoyantly, preferring often the society of jovial companions, free thinkers and actors, to that of the more accepted respectabilities of a staid literary metropolis. He had already fallen into the habit of turning his inward feelings into verse, and two dramas, *Die Laune des Verliebten* and *Die Mitschuldigen*, grew out of his more erratic impulses. After a brief interval passed in sickness at home, during which he read the books of the alchemists, he was transferred in 1770 to the university of Strasburg, where he renewed his studies of jurisprudence and the natural sciences, enlarged the number of his acquaintances, including Herder and Jung-Stilling, and fell in love with the daughter of a dancing master. Herder's friendship was of the greatest use to him, as it introduced him to the reading of Shakespeare, Goldsmith, and other English classics, and awakened within him a profounder sense of the grand poetry of the Hebrew Scriptures. He had fallen in with the family of a clergyman at Sesenheim, where there were two daughters, with one of whom, Frederika, he became enamored, and they were finally betrothed; but in leaving the university in 1771, he tore himself away from the bond and the attachment. Impetuous and headlong as he was, there was already a tendency in him to value external objects, human and others, as they assisted in that deep and varied culture which he began to make the principal aim of his existence. In 1772 he went to Wetzlar to practise law, and in the following year published a play destined to attract public atten-

tion toward him, and to give the world its earliest glimpses of his extraordinary genius. This was *Götz von Berlichingen*, a dramatic version of the story of Götz of the Iron Hand, an old predatory burgrave of the 16th century, who made war upon his fellow barons, sometimes to increase his own store, and sometimes in defence of the poor. His lawless career represented the sturdy struggle of feudalism against an advancing civilization, and Goethe seized the incidents to present them in a clear, powerful, picturesque, and dramatic whole. This work was the outbreak of a genius as rude and stalwart almost as Götz himself, asserting its freedom against the fetters of an artificial literary spirit; one of the earliest throes in that period of intellectual convulsion in Germany which has taken the name of the *Sturm- und Drangperiode*, or storm and pressure period. It excited the greatest enthusiasm in the literary world, and romantic dramas for a time became the fashion. In the interval Goethe had passed the time in wandering through the Rhine country. At Wetzlar he again fell in love, but as the object of his love, Charlotte Buff, was betrothed to one Kestner, to whom she was soon after married, the affection was not returned. A young student named Jerusalem, with whom Goethe was intimate, having committed suicide because of a similar unhappy passion for the wife of one of his friends, Goethe wove the incidents of the two cases into a novel, which he called *Die Leiden des jungen Werther* (1774), known in English as "The Sorrows of Werther." The sensation produced by it was prodigious. The most distinguished literary men praised it as a profoundly philosophic romance, while the common people were carried away by its eloquence and pathos. Its chief success, however, arose from the fact that it expressed a certain sad longing and discontent which was then a characteristic of the age. The same year he wrote *Clavijo*, a drama founded on Beaumarchais's memoir on Clavijo, projected a drama on Mohammed, another on Prometheus, only a few lines of either of which were written, and already revolved in his mind the drama of *Faust*. Two love engagements, one with Anna Sibylla Münch, and the other with Anna Elisabeth Schönmann, immortalized in his works under the name of Lili, diversified the experiences of this period. The fame acquired by *Werther* brought Goethe under the notice of Charles Augustus, grand duke of Saxe-Weimar, who in 1775 invited the poet to spend a few weeks at his court. Goethe went there, and the result of the friendship thus contracted was that Goethe thereafter made Weimar his permanent residence. He was created a *Geheimer Legationsrath*, or privy councillor of legation, at a salary of 1,200 thalers per annum; but his principal public occupation seems to have been to superintend the artistic pleasures of the court. Weimar was a small city, without trade or manufactures, but made up for its want of

commercial activity by its varied literary culture. It was filled with notabilities, among whom are to be noticed particularly Wieland, Herder, Musäus, Knebel, Seckendorf, Corona Schröter, the dowager duchess Amalia, Frau von Stein, and afterward Schiller. In this circle Goethe at once took his place as the presiding deity. "He rose like a star in the heavens," says Knebel; "everybody worshipped him, and especially the women." His first years there were spent in wild and tumultuous enjoyments, in which "affairs of the heart" did not always end with the heart. But Goethe's nature was too profound, his intellectual activity too great, to be long beguiled by the frivolities of masking, hunting, drinking, dancing, and dicing, and he resumed his more serious pursuits. The first fruit of his return (1779) was *Iphigenie auf Tauris*, a prose drama, which he afterward turned into a beautiful drama in verse. After a visit to Switzerland the same year, described in his *Briefe aus der Schweiz*, he composed a little opera, called *Jery und Bätely*, full of Swiss inspirations. He also began to devote himself strenuously to the study of natural science, in which he became a proficient. The novel of *Wilhelm Meister* was at the same time in progress, and many of his best small poems were produced at this period (1780-'83). In 1786 he made a journey to Italy, where he passed nearly two years in the most laborious study of its antiquities and arts, and in the composition of *Torquato Tasso*, a drama suggested by the life of that poet at the court of Ferrara. He was so absorbed in the past of Italy that he paid little attention to its present condition or people. The narrative of his travels, *Die italienische Reise*, contains the most charming descriptions of the scenes through which he passed. On his return to Weimar in 1788, he published *Egmont*, a romantic drama, full of passion and interest, representing a sombre and tragic episode in the revolution of the Netherlands, but in which he has not confined himself at all to the incidents of actual history; the character of Clärchen is by many regarded as one of his most successful female creations. A relation with Frau von Stein, which Goethe had long maintained, was now broken off, but he soon formed another with Christiane Vulpius. She was uneducated, and lived in some domestic capacity in his house; but Goethe afterward married her, to legitimate his son (born Dec. 25, 1788, died Oct. 27, 1830). In 1792 he accompanied the army of the king of Prussia and the duke of Brunswick in their campaign into France, of which he wrote an account. Soon after appeared his metrical version of *Reinecke Fuchs*. The results of his scientific studies appeared in his *Beiträge zur Optik* and his *Farbenlehre*, in the latter of which he had the hardihood to question the correctness of the Newtonian theory of colors. He wrote also on the metamorphosis of plants, and on topics of comparative anatomy. In all these he displayed a re-

markable penetration and sagacity, and his remarks on the morphology of plants are now reckoned among the earlier enunciations of the theory of evolution. His acquaintance with Schiller, who divided with him the suffrages of the poetic German world, began at Jena in 1794; and though their intercourse was cold at first, it ripened into one of the most enduring and beautiful friendships recorded in literary annals. Schiller's influence upon him was both stimulating and ennobling, and from this time forth we find him engaged in producing his grandest works. The first part of *Wilhelm Meister* (the *Lehrjahre*) appeared in 1795. *Hermann und Dorothea*, a pastoral poem in hexameters, the most perfect of his minor productions, was written in 1797; the *Achilleis* was executed the same year; and he engaged in friendly rivalry with Schiller in bringing forth a series of ballads, of which Goethe's part, *Die Braut von Corinth*, *Der Zauberlehrling*, *Der Gott und die Bajadere*, and *Die Schatzgräber*, are among the masterpieces of German literature. Even these, however, were only the preludes of what he was destined to do; for the *Faust* was still revolving itself in his thoughts, and the *Wilhelm Meister* went steadily forward. At last, in 1805, the great work of his life saw the light. The legend of Faust had been familiar to him as a child, he had thought of it and labored upon it during the whole of his youth, and now in the ripeness of his manhood it had taken its final shape. "It appeals to all minds with the irresistible fascination of an eternal problem, and with the charm of endless variety. It has every element—wit, pathos, wisdom, buffoonery, mystery, melody, reverence, doubt, magic, and irony; not a chord of the lyre is unstrung, not a fibre of the heart untouched." This work raised Goethe to the highest pinnacle of fame, and he was universally acknowledged to be the first poet of his age. If Goethe had died in 1806, he would have achieved a greater renown than any other modern man of letters; but he was destined to live 26 years longer, years of contentment, labor, productiveness, and honor. The stormy and errant impulses of his youth had been subdued; he had mastered himself and his circumstances; the great problem of life, which had filled him with strife and impatience, lay clear before him; his circumstances were easy; and his position at the head of German literature, which he had himself brought out of chaos or formalism into orderly vigor, gained him the homage of Europe. Schiller and other friends were dead; others again, friends of earlier days, were separated from him in sympathy by the large strides which his intellect had made in various paths of thought; and a sombre hue fell upon, without clouding, the serenity of his later years. Moreover, the external events of the world were full of trouble and agitation. It was the era of Napoleon's conquests. Germany palpitated with the rest of Europe in throbs of

war; and the grand duke of Weimar was drawn into the very vortex of commotion. On Oct. 14, 1806, the battle of Jena was fought, and Goethe heard in his calm home the reports of the cannonades. Soon that home was invaded; the French troops entered his house, ransacked his cellars, penetrated even to his bedchamber, and, though they treated him with respect, filled his soul with indignation and wrath. Goethe had all his life been averse to the disturbing influence of politics. His impassiveness under the tempestuous influences of the time had brought upon him the reproach of want of patriotism and of indifference to the welfare of humanity. But when the French approached Weimar, and Napoleon exhibited his spite against Charles Augustus for his active sympathy with his countrymen and allies, the long-pent feeling of the poet burst forth. "Misfortune!" he exclaimed to Falk; "what is misfortune? This is misfortune, that a prince should be compelled to endure such things from foreigners. And if it came to the same pass with him as with his ancestor, Duke John, if his ruin were certain and irretrievable, let not this dismay us; we will take our staff in our hand and accompany our master in adversity as old Lucas Cranach did; we will never forsake him. The women and the children, when they meet us in the villages, will cast down their eyes and weep, and say to one another, 'That is old Goethe and the former duke of Weimar, whom the French emperor drove from his throne because he was so true to his friends in misfortune; because he visited his uncle on his deathbed; because he would not let his old comrades and brothers in arms starve.'" "At this," adds Falk, "the tears rolled in streams down his cheeks. After a pause, having recovered himself a little, he continued: 'I will sing for bread! I will turn strolling ballad-singer, and put our misfortunes into verse! I will wander into every village and every school wherever the name of Goethe is known; I will chant the dishonor of Germany, and the children shall learn the song of our shame till they are men; and thus they shall sing my master on to his throne again, and yours off his!'" But as the noise of the French cannon withdrew from Weimar, he began to pipe once more in his old peaceful strain. All through the revolutionary tumult, in fact, he took refuge in his studies and scientific experiments. On occasion of an interview with Napoleon he scarcely remembered the enthusiasm with which he had spoken to Falk. Napoleon is reported to have said, *Vous êtes un homme*, and fell to criticising his works, especially *Werther*, which he had read, he said, seven times. Goethe was flattered by the appreciative words of the emperor, was invited to Paris, and afterward was decorated with the cross of the legion of honor. In 1809 Goethe printed the most exceptionable of his novels, the *Wahlverwandtschaften* ("Elective Affinities"), in which the charms and graces of his style are employed in

the description of the impulses which spring from the collision of passion and duty in the relations of marriage. By the title of the book, and in the whole spirit of it, he would represent that sexual affinities follow the same inevitable law as chemical affinities, and that humanity struggles impotently against the dictates of nature. Like all his productions, this was suggested by circumstances in his own experience. The work shocked the moral world, in spite of the beauty with which it was written, and to this day tasks the ingenuity of those of his admirers who seek to defend it from attack. His next volumes were of a less doubtful kind: the ballads *Der Todtenkranz*, *Der getreue Eckart*, and *Die wandernde Glocke*, the *Dichtung und Wahrheit*, an autobiography, and the *Westöstlicher Divan*, a collection of oriental songs and poems. His studies of science and contemporary literature were meantime never remitted. In 1816 he published an art journal, *Kunst und Alterthum*, to which he contributed largely; and in 1818 the second part of *Wilhelm Meister*, the *Wanderjahre*. In 1825 the jubilee or 50th year of his residence in Weimar was celebrated in a grand public festival. In 1831 the second part of *Faust* appeared, a continuation of the first part, obscure and mystical, but full of passages of rare splendor, profound thought, grotesque humor, and bewitching melody. He supposed himself, and many critics supposed, that under the motley garb of the poem there is a deep significance, although few have succeeded in detecting it, while Goethe's own explanations are arid and unsatisfactory to the last degree. As a dramatic poem it cannot be denied that it was a failure, even if we admit that as an enigma, covering some recondite philosophy, it deserves the closest study. The songs at least, and the lyrical parts, are excellent. The old man had lost vigor, but his feelings were still exuberant, and the singer remained. "If Goethe," said an admirer of his, "everywhere great, is anywhere greatest, it is in his songs and ballads. They are the spontaneous outpourings of his mind in all its moods; a melodious diary of his daily and almost hourly fluctuations of feeling; the breathings of his inward life; the sparkling perennial jets of his momentary affections and thoughts. There is the perpetual freshness and bloom about them of new spring flowers. Even when they seem most trivial, they ring through us like snatches of music. So perfect is the correspondence of form and substance that their charm as a whole defies analysis. It is felt, but cannot be detected. Then, again, how diversified they are! Some as simple as the whimpers of a child; others wild, grotesque, weird, and unearthly; and others again lofty, proud, defiant, like the words of a Titan heaping his scorn upon the gods." One year after the completion of *Faust* Goethe was taken ill of a cold, which turned into a fatal fever. Up to the hour of his death, however, he prosecuted his intellectual pursuits. His last writing was

an essay on the dispute between Geoffroy Saint-Hilaire and Cuvier, on the question of unity of composition in the animal kingdom; and his last words were, "More light." He was then in the 83d year of his age. A seal, with an inscription from one of his own poems, *Ohne Hast, ohne Rast*, sent to him on his birthday in 1831, by 15 Englishmen, had given him great delight, for among the Englishmen who participated in the homage were Wordsworth, Scott, Southey, Wilson, Lockhart, and Carlyle. Goethe was the master spirit, the spokesman, as Carlyle says, of his age, the artist *par excellence* of the 19th century.—The letters of Goethe are among the best illustrations of his character. They are, in the chronological order of the periods covered by their dates, those to friends in Leipsic (published in 1849), to Merck (1835-'47), to Jacobi (1846), to Lavater (1833), to Herder (1858), to Knebel (1851), to Klopstock (1833), to the countess Augusta of Stolberg (1839), to Frau von Stein (1848-'51); his correspondence with Schiller (6 vols., 1828-'9; 2d ed., 1856; translated into English by G. H. Calvert, Boston, 1845), with Zelter (6 vols., 1833-'4), with A. W. von Schlegel (1846), with the baron von Stein (1846), with Nikolaus Meyer (1856), with Döbereiner (1856), with Reinhard (1850), with Grüner (1853), with C. F. L. Schultz (1836), and with the councillor Schultz (1853); *Goethe's Briefe und Aufsätze aus den Jahren 1766-'86* (Weimar, 1856); "Goethe's Correspondence with the Brothers Humboldt, 1795 to 1832," edited by Prof. Bratanek (3 vols., Cracow, 1873); and his *Naturwissenschaftliche Correspondenz* (2 vols., Leipsic, 1874). His "Correspondence with a Child" (Elisabeth or Bettina von Arnim) is not genuine. (See Lewes's "Life of Goethe.") The most important notices by his contemporaries are those of Eckermann, *Gespräche mit Goethe* (Leipsic, 1836; translated into English by Margaret Fuller, Boston, 1839), and Falk, *Goethe aus persönlichem Umgang dargestellt* (Leipsic, 1832). The best biographies are by Viehoff (4 vols., Stuttgart, 1854; 3d ed., 1873), Schäfer (2 vols., Bremen, 1851; 2d ed., 1858), and G. H. Lewes (2 vols., London, 1855; translated into German, Berlin, 1857-'8; new ed., abridged, 1873). Among recent works relating to Goethe are: "Goethe and Mendelssohn," by Karl Mendelssohn (English translation, London, 1872); *Goethe: ses œuvres expliquées par sa vie*, by A. Mézières (Paris, 1872); and *Les maîtresses de Goethe*, by Henri Blase de Bury (Paris, 1873). Bayard Taylor and Karl Goedike have lives of Goethe in preparation. The oldest complete edition of his works is that of Stuttgart and Tübingen (40 vols., 1827-'31, to which his posthumous works were added, 15 vols., 1833-'4). Subsequent editions are numerous; the best are the latest, published by Cotta (30 vols. 12mo, and 12 vols. 8vo, Stuttgart and Tübingen, 1856-'60). Many of his works have been translated into different languages. Among the best into English are "Götz von Berlichingen," by Walter Scott

(1799); "Wilhelm Meister," by Thomas Carlyle (1824); "Truth and Poetry," by Parke Godwin (1847); and "Hermann and Dorothea," by Miss Ellen Frothingham (1870). Of "Faust" there have been many translations; the best are those of Charles T. Brooks (Boston, 1857), and Bayard Taylor (Boston, 1870-'72). A monument to Goethe, to be executed by Schäfer, and erected in the Thiergarten, Berlin, was commenced in 1873.

GOFFE, William, an English regicide, born about 1605, died in Hadley, Mass., in 1679. He was one of the most fervent of the Puritans, was a devoted adherent of Cromwell, one of the best officers of the parliamentary army, and one of the judges who tried Charles I. After the death of the protector and the restoration of the Stuarts he escaped to America, and was in 1660, with his father-in-law Edward Whalley, received with courtesy by Gov. Endicott at Boston. Warrants soon after arrived for their arrest, a price was set on their heads, and Indians as well as English were sent in pursuit of them. They removed from house to house, living in mills, in the clefts of rocks on the seashore, and in caves in the forests. They hid themselves for months in a cavern near New Haven, from which they issued only by night. This retreat was discovered, and they fled successively to Milford, Derby, and Branford. At length they found an asylum in the house of a clergyman at Hadley, where Goffe passed the remaining 15 years of his life. In 1675 the town of Hadley was surprised during a religious service by the Pokanoket Indians under their celebrated chieftain Philip. The inhabitants were about to fall beneath the tomahawk when an old man with a long white beard appeared in the church, rallied the disheartened colonists, disposed them for a charge upon the Indians which he himself led, and put the savages to flight. This was Goffe, who in the moment of victory disappeared again for ever, leaving the colonists in the persuasion that a heavenly messenger had fought for them.

GOG AND MAGOG. These names occur unconnected in Genesis and 1 Chronicles as the names of several persons; Magog, in the ethnological table of the former book (ch. x.), being the second son of Japheth, and brother of Gomer and Madai, who are generally considered to represent the Cimmerians and Medes respectively. In Ezekiel Gog and Magog are connectedly used to designate a prince and a people of the north, apparently of the Scythian race. In the book of Revelations the words denote the enemies of Christianity who were doomed to destruction. The two famous effigies in Guildhall, London, known as Gog and Magog, have been from time immemorial the pride of the city. There are various legends relating to them. According to one, they represent the last survivors of a race of giants who infested Britain, and were extirpated by the Trojans who came there soon after the destruction of Troy. They were chained as

porters before the palace gates, and when they died their effigies took their place. Another legend says that one of the giants is Gogmagog, and the other Corineus, a British giant who killed him. The effigies, originally of wickerwork and pasteboard, were borne about in public shows and processions as early as 1415, and probably long before. The present ones, carved in wood, and hollow, were set up in 1708. They stand upon octagonal pedestals, and are 14 ft. high.

GOGOL, Nikolai, a Russian author, born about 1809, died in Moscow, March 4, 1852. He is said to have failed as an actor, and afterward to have attempted in vain to obtain a position under the government. Subsequently he published "Evenings at a Farmhouse," a collection of tales and sketches, which met with much favor. His first drama was "The Inspector," in which the corruption and venality of the officials was severely satirized. About 1834 he was appointed professor of history in the university of St. Petersburg. In 1842 he published a novel, "Dead Souls," which has been translated into English under the title of "Home Life in Russia" (London, 1854). It narrates the adventures of a rogue who goes about purchasing the rights of the proprietors to serfs recently dead, whose names have not yet been taken from the rolls, in order to obtain advances from government. This work attained great popularity. He went abroad soon after, and in his "Correspondence" (published in 1847) he eulogized the abuses which he had before satirized. By this he lost the favor which he had won from the liberals. He fell into a state of religious melancholy, and destroyed all his unpublished manuscripts, some of which he said were written under the inspiration of the devil. His complete works, comprising tales, dramas, and poems, have been published in 4 vols. (Moscow, 1862).

GOGRA, or **Goghra** (Hindoo, *Gharghara*; the *Sareyu* of Hindoo mythology, and, according to Rennell, the *Agoranis* of Arrian), a river of India, which rises on the frontiers of Thibet, in the Himalayas, at an altitude of about 18,000 ft., flows S. and then S. E., and falls into the Ganges near Chupra, 115 m. below Benares. It is at first a vast torrent, having a descent of 15,500 ft. in 75 m.; but after receiving several affluents, it becomes navigable for vessels of considerable size, the descent diminishing to 12 ft. per mile. Its whole length is about 600 m. At its junction with the Ganges it exceeds that river in depth, breadth, and volume of water.

GOITACAZES, an Indian tribe of Brazil, long masters of the region lying between the Rio Cabapana or Itabapana and Cape São Thomé, whence they repeatedly repulsed the Portuguese who attempted to settle in those parts. Their only weapon was the bow and arrow, in the use of which they were very skilful. They usually took up their abode in places surrounded by water, their dwellings being cabins made of palm leaves suspended from tree

trunks, serving at the same time as a sort of ambuscade. Father Vasconcellos, a writer of the 17th century, reports that they were a ferocious and cruel people, addicted to eating human flesh. Many of these Indians had nevertheless before his time been baptized as Christians, and lived in villages where their descendants are still found, in the northern portion of the province of Rio de Janeiro, rarely mingling with the whites. Their numbers are considerable, and they are ingenious, skilful, sprightly, and frank when kindly treated, but vindictive, improvident, and intemperate.

GOITRE, an elastic swelling on the front and sides of the neck, arising from a hypertrophy of the thyroid gland; it is also called bronchocele and Derbyshire neck. It is generally soft and yielding, and varies in size from that of a nut to a mass surrounding the greater part of the neck, sometimes descending far upon the chest; it is usually slow in its growth, and may increase in either lateral lobe or in the median isthmus; it is accompanied by neither tenderness nor discoloration of the skin, and is generally definitely circumscribed. When of small size it occasions no inconvenience; but when large its weight and pressure upon the trachea, cesophagus, vessels, and nerves cause headache, difficulty of breathing and swallowing, congestion of the brain, with dizziness, lividity of the face, protrusion of the eyes, alteration of the voice, dulness of hearing, obstinate cough, ending in pulmonary disease, and threatening even apoplexy and suffocation. The anatomical character of the disease is the enlargement of the cells of the gland, which are filled with a viscid fluid or with blood; in old cases the tumor may become hard and partly bony. All ages are subject to goitre, but young persons and the female sex are most liable to it; it is also hereditary. Though occasionally sporadic, it is essentially an endemic disease in cold and damp countries, as in the deep valleys of the Alps, where the air is moist, cold, and stagnant; it is most common in mountain valleys of the Alps, the Pyrenees, the Himalaya chain in Asia, the Cordilleras in America, the high regions of Scotland, and the chalky districts of Derbyshire and Nottingham in England. Though often connected with cretinism, it does not appear to be a serofulous disease; neither is it confined to persons living in poverty and uncleanness, for it is the sad inheritance of many wealthy families. Various causes have been assigned for goitre, but none of them are entirely satisfactory; the most probable are the insufficient illumination by the sun, moisture, and stillness of deep valleys; deleterious emanations from clayey soils; the use of snow water, or that from springs, arising from calcareous formations; the deoxygenation of water from great elevation, or its contact with metallic and organic matters eagerly absorbing oxygen. It seems to be connected rather with the geological than with any other character of a region. Goitre may be distinguished from oth-

er tumors in the neck by its shape, consistence, and general development on both sides. The prognosis in a person advanced in life is unfavorable, but in early life it may be cured. The chief remedy for this disease is iodine, both internally and externally, either alone or combined with potash and iron; the patient should be removed from the infected district to the seashore, and a tonic regimen be pursued. When suffocation is imminent from the pressure of the tumor, relief may be obtained for the time by puncture, the seton, ligatures of the supplying arteries, or by extirpation of the gland; the last three are dangerous to life, and have proved fatal, and the first three may fail even if the patient survive the operations. The usual treatment is simply palliative, iodine with tonics and narcotics. There is a form of goitre not uncommon in anæmic females in the United States and in England, with the symptoms of the Alpine disease, though milder, and relieved by the tonic treatment of anæmia.

GOLCONDA, an ancient city and fortress of India, in the native state of Hyderabad or the

Nizam's dominions, 7 m. N. W. of Hyderabad. The fortress stands on a rocky eminence, and is a large and strong edifice. It is now chiefly used as a prison, and as a depository for the treasures of the Nizam. The principal inhabitants and bankers of Hyderabad are also permitted to retain houses in it, to which on any alarm they retire with their money and other valuables. About 600 yards from the fortress are the tombs of the ancient kings of Golconda. Each mausoleum occupies the centre of a large quadrangular platform, which is approached on every side by granite stairs. They are mostly constructed of gray stone, ornamented with stucco and Indian porcelain, whose colors retain all their pristine brilliancy, and on which are engraved in white characters various extracts from the Koran. These mausolea are very numerous, and have a striking and impressive appearance when viewed from a distance. Golconda was formerly renowned for its diamonds, but they were merely cut and polished here, being generally brought from Parteall in the S. part of the Nizam's domin-



Tombs of the Kings, Golconda.

ions. It was anciently the capital of a powerful kingdom of the same name, which arose on the overthrow of the Bahmani empire; but it was taken by Aurungzebe and annexed to that of Delhi.

GOLD, a precious metal, ranking the first in beauty and value among useful metals from the earliest times to the present day; distinguished for being the only metal of a yellow color, and for possessing in the highest degree the properties of ductility and malleability. In chemistry its symbol is Au, from the Latin *aurum*, gold; its equivalent number 98.5, or, in the usage of many chemists, the double of this, 197. Its density varies according as the metal is more or less compressed; it is rated when hammered at from 19.258 to 19.4. In a finely

divided state, precipitated from its solution by sulphate of iron, it has proved of specific gravity 20.72. When pure the metal is nearly as soft as lead, and is then susceptible of its greatest extension by beating or wire-drawing. (See GOLD BEATING.) In thin leaf it is transparent, and the transmitted light is of a green color; by heat the color is changed to ruby red, and this color the metal finely divided imparts under certain conditions to glass. Its melting point is variously given as 2016° F., 2192°, 2518°, and 2590°. In the heat of furnaces it is not volatilized; but gold wire is dispersed in vapor by the oxyhydrogen blowpipe, by the heat of the sun's rays concentrated by a powerful convex lens, or by the electric battery. As the current traverses it, the vapors pro-

duced may be collected upon a sheet of paper placed beneath the wire; the paper is stained a purplish brown by the deposit of finely divided gold, and a sheet of silver may be thus gilded. When gold is fused in large quantity and allowed to cool slowly, cubical crystals are sometimes observed to form, and crystals of native gold have been found in the form of the regular octahedron. Gold is not acted upon by alkalis or simple acids, except selenic, nor by the oxygen of the air even when long exposed in a fused state. Neither does sulphur affect it; but it is dissolved by bromine and chlorine, or by any combination of acids or other substances in which free chlorine is present. This element, as it is generated in mixtures, is a powerful solvent of gold; and to it is due this property of the compound called *aqua regia*, formed of 4 parts of hydrochloric and 1 part of nitric acid. Gold forms alloys with most of the metals. Silver or copper increases its hardness and renders it better adapted for wear when used for coins, jewelry, or plate. Such compounds are also more fusible than pure gold. The solder for gold trinkets is 1 part of copper to 5 of gold, or to 4 of gold and 1 of silver. With mercury gold unites to form an amalgam. Mercurial fumes even, coming in contact with gold, instantly combine with and whiten it. The mercury may be driven off by heat. (See AMALGAM.) Gold is obtained from its solutions in various forms. The precipitate by sulphate of iron is a dull brown powder, which by pressure acquires the metallic lustre and color. The precipitate by oxalic acid is yellower and more metallic in appearance. The metallic gold which is left on evaporating a solution of its compound with chlorine and heating the residue is of a spongy character and dull hue; by annealing it becomes more dense and yellow, and by percussion is readily welded together. (For modes of preparing sponge gold and its uses, see DENTISTRY.)—Gold is very widely distributed in nature, and late researches have shown that it is present in appreciable quantities in the waters of the ocean, where it is associated with silver. According to Sonstadt, a ton of sea water yields by a simple chemical process a grain of gold; so that the quantity of the precious metal thus held in solution must be vastly greater than all the gold ever yet extracted from the earth. Gold is very generally diffused throughout the solid rocks, though only here and there accumulated in sufficient quantities to be economically available. The workable deposits of this metal are in stratified rocks of different formations, from the oldest crystallines to the postpliocene sands and gravels, and also in veins traversing rocks of various geological periods. The most common vein-stone of gold is quartz, but it is also found in bitter spar and disseminated in metallic sulphides, such as iron pyrites, which very often contains sufficient quantities of the metal to be extracted with profit. In this as well as in the

quartzose gangues the gold is sometimes in large grains or crystalline threads or masses, and sometimes disseminated in particles invisible to the eye. The opinion is entertained by many that in pyrites and in other sulphuretted ores the gold is sometimes chemically combined with the other metals and with sulphur. It has been found that the lead of commerce, from whatever source derived, is seldom or never without a trace of gold. Gold is not, as has been erroneously supposed, confined to rocks of any one geological period. The gold of Colorado is found in veins with metallic sulphurets traversing crystalline rocks of eozoic age, and the same is the case in Ontario; while the gold-bearing strata of the Appalachians are in large part if not wholly of prepalæozoic age, as are those of the Alps and the Ural mountains. In Nova Scotia, on the contrary, the gold-bearing rocks are slates and sandstones, supposed to be of lower Cambrian age; and the auriferous strata of Wales as well as those of Australia are of that period. The gold-bearing veins extensively worked in Transylvania traverse sandstones of eocene or early tertiary age, and the gold-bearing quartz of California is said to be found in strata of the Jurassic formation. It is probable, however, that a part of the auriferous rocks of that country will be found to be eozoic, while on the other hand it appears that the silicious deposits now forming from the thermal waters in Nevada contain not only metallic sulphurets but small portions of gold; so that the processes which in former times gave rise to gold-bearing veins in that region are still in operation.—By the disintegration and crumbling away of the rocks which contain the auriferous veins, the contents of these are swept down to lower levels, and the gold by its density always seeks the lowest places among the moving materials. Thus are produced the auriferous gravel deposits in alluvial formations, the golden sands of the rivers; and so have they been gathering for long ages past and forming deposits, some of which are now seen in situations apparently out of reach of such agencies. In these deposits, when stripped of the clay and sands which cover the lower and richer layers, there are found in the irregular-shaped cavities of the surface of the rock, in pockets and in piles against the projecting strata, the accumulated riches of ancient veins, it may be, of vast extent. By washing away the intermixed earthy and stony matters, the metal is obtained in dust, flattened scales, small lumps, and nuggets of all sizes and shapes, the larger pieces rounded by attrition, or ragged from the irregular forms they held in their original hard quartz matrix. Their size is commonly greater than that of gold found in the veins near by, a fact first explained by the late Oscar Lieber of South Carolina to be due to the solution of gold and its subsequent aggregation. Later observations of Genth and Selwyn go to confirm this view. In these deposits the largest lumps

of gold ever met with were discovered, as that of Cabarrus co., N. C., of 28 lbs. avoirdupois, or 37 lbs. troy, found in 1810; the mass weighing 96 lbs. troy in Zlatoust, a district of the southern Ural, in 1842, and now in the imperial school of mines at St. Petersburg; a mass from Victoria in Australia, which was exhibited in London, and weighed 146 lbs. 3 dwts. troy, of which 6 oz. only were estimated as matrix; and the still larger mass found at Ballarat in that region, and weighing 2,217 oz. 16 dwts., or about 185 lbs. troy. According to Phillips, the largest piece of gold ever found was probably the great Australian nugget, known as the "Sarah Sands," which weighed 233 lbs. 4 oz. troy. Though in a metallic state, gold is never obtained pure; silver is always alloyed with it, but in no definite proportions. The purest specimen is probably one from the Ural, near Yekaterinburg, analyzed by Rose, which gave, in 100 parts, gold 98.96, silver 0.16, copper 0.35; its specific gravity was 19.099. The product of California is much of it very near the richness of gold of the American and French gold coins, which is 900 parts in 1,000. Its average, however, is stated to be $\frac{900.5}{1000}$ to $\frac{988}{1000}$, and that of Australia $\frac{960}{1000}$ to $\frac{966}{1000}$. A specimen of California gold, containing gold 90.70, silver 8.80, and iron 0.38, was of specific gravity only 14.6, and by fusing this was increased to 17.48. Gold from the Chaudière, Canada, of specific gravity 17.60, analyzed by T. Sterry Hunt, gave gold 87.77, silver 12.23; another specimen in fine scales, of specific gravity 16.57, produced gold 89.24, silver 10.76. Copper, palladium, and rhodium are also met with as alloys of gold. In Transylvania veins are worked producing an alloy of tellurium, gold, silver, and antimony; the tellurium commonly constitutes from 55 to 60 per cent., and the gold from 25 to 30 per cent. The same compound has been recognized at Gold Hill, N. C. Gold occurs in a few other combinations also with tellurium.—In the oldest records of the human race mention is made of gold, and like silver it was enumerated as an element of riches. Throughout the Old Testament there are frequent allusions to gold and to fine gold. It was beaten into thin plates, cut into wires, and even woven with threads of linen for the sacerdotal robe of Aaron. It was fashioned into breastplates with chains at the ends of wreathen work of pure gold; and it was used as the setting of precious stones. By other nations it was made into gods and idols, some of gigantic size. Aaron prepared a golden calf for the children of Israel, which Moses burned with fire and reduced to powder; an operation that might have been effected by first melting and beating it out into plates. In building the temple of Jerusalem the quantities of gold lavishly employed by Solomon for its furniture and decorations implied that it was largely collected, and that the ancients had access to mines of great extent and richness. Atahualpa, the

captured inca of Peru, agreed to bring together for his ransom, in the space of two months, articles of gold which should fill a room 22 ft. long and 17 broad to the height of 9 ft. When this was done and the gold melted, it was found to amount to 1,326,539 *pesos de oro*. The commercial value of the *peso*, according to Prescott, was equivalent to \$11 67, making the sum total \$15,480,710. The source whence the Phœnicians and Israelites derived their immense supplies of gold was the land of Ophir, a region still of uncertain locality. Once in three years the fleet of Solomon completed a voyage to it and back. Its other products besides gold brought back to Palestine (1 Kings x. 11 and 22), as ivory, spices, precious stones, ebony, peacocks, apes, and the almug or sandal wood, indicate that it was in the tropics. It is generally presumed to have been either the East Indies or that part of the S. E. coast of Africa called Sofala by the Arabs. The auriferous character of the desert steppes of Gobi was known in the time of Herodotus to the inhabitants about the sources of the Indus; and to this day are to be seen along the southern Ural the works of ancient mining operations, supposed to be those of the nomadic Scythians. Ethiopia and Nubia also were largely productive of gold; and the ancient mines discovered by Belzoni in the Zabarah mountains are supposed to have furnished to the Pharaohs of Egypt their abundant supplies. Thus many auriferous regions appear to have been known at different times, as productive as those of the present period. While the gold of the deposits continued abundant they were vigorously wrought, and each district furnished in its turn the principal share of the production of the world. In the time of the Romans the precious metals were not so abundant, though rich deposits were worked along the foot of the Pyrenees, and in some of the provinces bordering the Alps. Strabo (B. iv. ch. 6, sec. 12) refers to the statement of Polybius that in his time the gold mines near Apulia were so productive that the value of gold was reduced one third in Rome. Spain, too, had its deposits worked in ancient times along the Tagus; and the Athenians gathered their supplies of the metals from Thessaly and the island of Thasos. In the middle ages the art of working gold appears to have been little practised. The richness of the known mines was comparatively exhausted, and previous to the opening of the new fields following the discovery of America, the attention of metallurgists was directed to vain attempts to transmute the baser into the precious metals. It was estimated that at the time of the discovery of America the gold and silver in the old world, exclusive of the more or less unknown regions of the East, was reduced to about £34,000,000, and that the supply no more than met the loss by wear. The enormous importation of gold and silver from the new world soon made up the deficiencies of the old mining regions, and, reducing the value

of the metals in comparison with other products, caused mines which had before been successfully worked to be abandoned as unprofitable. From 1492 to 1500 the annual amount of gold brought into Europe from America is rated by Humboldt at £52,000; till 1519 gold only was obtained. The same proportion may safely be extended to the year 1521, when Mexico was conquered, and the precious metals, but more especially silver, were obtained in vastly larger quantities. The mines of Potosí, discovered in 1545, gave a still greater preponderance to the production of silver, and no data are afforded for afterward distinguishing the relative proportions of the two metals. But in the first 300 years succeeding the discovery, the receipts of American gold were estimated at $3\frac{1}{2}$ times the product of the mines of the old continent, and those of silver at 12 times the product of this metal. In the time of Queen Elizabeth gold was obtained at Leadhills in the south of Scotland; and toward the close of the last century, in the county of Wicklow in Ireland, about \$50,000 worth of gold was collected in two months. These deposits soon, however, proved unprofitable. The metal was in ancient times collected in Cornwall, and is known to exist in Devonshire. The largest portion of British gold has been the product of Wales, the principal gold-bearing district of which is confined to an area of about 25 sq. m. in North Wales. The mines are still worked, but there has been a great decrease in the production. Upon various rivers of Europe, as the Rhine, the Rhône, the Danube, the Reuss, and the Aar of Switzerland, the sands were known to be auriferous in places, but too poor to pay the expenses of working. In Hungary veins containing gold disseminated in ores of sulphuret of silver are worked in a partially decomposed feldspar of the trachytic formation, and also in syenite and porphyritic greenstone; and gold is also extracted from auriferous pyrites of trap rocks of the most recent formation. The mines of Nagy-Ág and Zalátna in S. W. Transylvania produce the alloy of tellurium and gold before referred to. Besides gold, the Hungarian mines, worked by the Austrian government, produce copper, silver, mercury, antimony, lead, iron, and cobalt. In the Austrian provinces of Salzburg and Tyrol, at Bockstein and at Zell, gold is extracted from poorer ores than are elsewhere ever found profitable to work. The quartz gangue of the veins and the argillaceous slates of the walls contain auriferous pyrites, argentiferous mispickel, gray argentiferous copper, and sulphuret of silver. From these the gold is profitably extracted when it amounts to only from 6 to 15 parts in 1,000,000. At Zell it has been stated that the annual product of 50,000 quintals of ore has been only 35 marks of gold, or 4 parts in 1,000,000. The silver, though obtained in six or seven times the quantity of the gold, is still less than half its value. The total production of the Austrian mines for several years past

has averaged from 5,500 to 5,800 oz. per annum. In Italy various localities were known to the ancients as producing gold. At present the only mines of consequence are in Piedmont, in the valleys of Anzasca, Toppa, and Antrona, and to a less extent in those of Alagna, Sesia, and Novara. In Lombardy the chief mines are at Peschiera and Minerva di Sotto. The ore is an auriferous pyrites containing about 12 dwts. of gold per ton. The total yield of all the mines does not exceed \$100,000 per annum. In France a small amount of gold is produced, chiefly from auriferous galena; and there are deposits in Savoy. Gold mines have been worked in Spain from very remote periods, but the present annual production does not exceed about \$10,000. The mines of the Asiatic slopes of the Ural extend along the secondary ridges of the chain in a N. and S. direction more than 400 m. The crystalline rocks here contain veins, one of which is successfully worked at Bereзов, near Yekaterinburg, by shafts and levels. The gangue is pyritiferous quartz with oxide of iron resulting from its decomposition, and the rock is a partially decayed granite, the quartz remaining in angular grains; the adjoining formations are talcose and chloritic slates. All the other workings of Russia are alluvial mines. These are not only in the Ural district, where they have been worked for more than a century, but during the reign of Nicholas a region of southern and eastern Siberia, estimated to be as large as all of France, was found to be more rich in gold than that of the Ural. From the great E. and W. chain of the Altai mountains, which lie between Siberia and Mongolia, low ridges are directed toward the north into the governments of Tomsk and Yeniseisk, and these ridges of crystalline rocks are the repositories of the precious metals. In 1843 this region produced the value of about \$11,000,000, while the product of the Ural districts for the same year was only about \$2,500,000. Until the discovery of the mines of California it made Russia the greatest gold-producing country of the world. The average production of the Russian mines amounts to about \$15,000,000 annually; and their total production from their discovery about 1745 to 1874 may be stated in round numbers at \$600,000,000. The product in 1865 was given by Phillips at 69,500 lbs. troy.—Little is known of the other gold regions of the continent of Asia. The metal is possessed, and its deposits are no doubt worked to considerable extent, by all the principal nations; but except from the islands of the Indian archipelago little of it falls into the general circulation of the world. The river Pactolus of Asia Minor is supposed to have furnished from its golden sands the foundation of the wealth of Cræsus. According to Pumpelly, who made geological researches in China, Mongolia, and Japan during 1862-'5, gold exists in numerous localities in no fewer than 14 of the 19 provinces of China. The richest regions appear

to be in the province of Szechuen and along the branches of the Kuenlun mountain range, which, extending in a general E. and W. direction, penetrate far into central China, between Szechuen and the Wei river. There are also numerous washings at the base of the watershed between Kweichow and Hunan, and through the centre of Shantung from S. W. to N. E. In these localities placer gold is found, and some of them are mentioned as furnishing nuggets; but little is known of the production of these washings. It is said that extensive sources of gold have long been known in China, but that the working of the mines has been discontinued by the government in accordance with some of their financial theories. The gold-bearing formations of eastern Siberia are believed to extend into Chinese Tartary, and to connect with those of central and southern China. For several centuries Japan has ranked high for its production of gold, which constituted a chief article of the commerce carried on by the Portuguese and Dutch traders. According to a Japanese authority, the value of the gold exported from Nagasaki from 1611 to 1706 amounted to \$68,000,000, and of silver to \$157,000,000; while Hildreth states that the value of the precious metals exported from Japan during the two centuries beginning with 1540 could not have been less than \$200,000,000. But little is known concerning the present production of gold in the empire, or the localities where it exists. The gold regions on the island of Yesso were surveyed in 1862 by Blake and Pumpelly, while in the service of the tycoon's government. According to Blake, the gold region extends along the Kunui and Pusibets rivers and in the range of mountains dividing Volcano bay from the west coast. Deposits are also supposed to exist in the northern and interior portions of the island. No veins have yet been found, the gold being obtained from washings. It is in fine scales, and occurs in the gravel along the streams; it is also found in high terrace deposits on the hillsides. The annual product of the island does not probably exceed \$25,000. There are also extensive mines upon a large vein of mixed silver and gold ore on the island of Sado, off the N. W. coast, which is supposed to have furnished a large amount, but the facts regarding it are jealously guarded by the Japanese. Gold is largely used in Japan for gilding, for inlaying and overlaying metals, and for alloys with copper and silver of various colors and degrees of fineness. Gold has long been found in abundance in Borneo; according to Kloos, the metal occurs in varying quantities throughout the entire island. Placer gold is found on the river Kapola, associated with iron ores, sulphuret of antimony, and diamonds. The production of gold has also been reported in India, Thibet, Ceylon, Sumatra, Celebes, and the Philippine islands.—Africa is believed to have been the source of a large proportion of

the gold possessed by the ancients, and is reported by modern travellers to be still rich in it. The unmanufactured gold obtained from that country is in the form of dust, evidently obtained from alluvial washings. Russeger, who travelled through Nubia in 1838, reported the mountain chain extending across the interior of Africa from E. N. E. to W. S. W., and the streams flowing from it, to be auriferous. In Sennaar and southern Abyssinia gold occurs in placer deposits and in quartz veins traversing granite, gneiss, and chloritic slates. The greatest portion of the gold brought to the coast is from the fields of Bambook, south of the Senegal, the most important mines in Africa. There is a gold district in Kordofan on the upper Nile, between Darfour and Abyssinia, and it is obtained in small quantities opposite Madagascar. A few years ago the annual production of Africa was estimated by Birkmyre at 4,000 lbs., valued at about \$900,000. In 1866 the existence of extensive gold fields in south Africa, between lat. 17° and 21° 30' S., was discovered by Hartley, an elephant hunter, and a German scientific traveller named Mauch. The gold fields occupy the interior region between the Zambesi, W. of Tete, and the middle course of the Limpopo river. The distance to them from the Portuguese settlement of Sofala is about 350 m. The region containing the gold is an elevated table land about 7,000 ft. above the sea; it is chiefly occupied by the Matabele section of the Caffres, a warlike tribe. The travellers above named found beds of glistening white quartz rock extending over this table land, which were found upon examination to contain gold. Particles of gold were also found along the sandy margins of rivulets. It is supposed by some that these mines were known to the Portuguese as early as the 17th century, and by others that here was the Ophir of Solomon. Although the discovery of the south African gold fields attracted considerable attention, the production hitherto seems to have been unimportant.—The first known discovery of gold in Australia was made by Count Strzelecki in 1839, and by him communicated to Sir George Gipps, then governor of the colony of New South Wales. In deference to the wishes of the latter, who was of opinion that a widely spread knowledge of the existence of gold would prevent the maintenance of discipline among the 45,000 convicts there collected, the discovery was not proclaimed to the world. It was rediscovered in 1841 by the Rev. W. B. Clarke, a geologist, upon whom also silence seems to have been enjoined by Governor Gipps. Without knowledge of these discoveries, it is said, Sir Roderick Murchison in 1844 publicly asserted the high probability of the existence of gold in Australia. It is also said that gold was found at Clunes, Victoria, in 1850. The discovery, however, which led to the extensive working of the mines was made in 1851 by Mr. E. H. Hargreaves, who had just returned from Cali-

fornia, and at once began prospecting near Bathurst on the Macquarie river, New South Wales, where gold was found in considerable quantities. The announcement of this fact caused much excitement and a sudden immigration of great magnitude to this region. (See EMIGRATION). The government at once laid claim to the land and began to grant licenses to dig for gold. The gold region was soon traced along the range of hills N. and S., and new discoveries were made of deposits surpassing all the rest in richness in the colony of Victoria, near the southern coast, 70 m. N. W. of Melbourne. In October there were 7,000 persons engaged in the new diggings at Ballarat near Mt. Buninyong, occupying less than a square mile in extent. The next month many of these were drawn off to the still richer deposits about Mt. Alexander in the same region, where it was estimated that 10,000 persons were then employed. In December 63,300 oz. were transported to Melbourne from this locality, which was then valued at £319s. 6d. per oz. The whole amount conveyed from the two localities from Sept. 30 to Dec. 31 was 124,835 oz.; the whole product of the colony was 345,146 oz. The immigration the next year of 104,000 more than doubled the population of Victoria; still richer diggings were discovered at Bendigo, and the total product of the colony for the year 1852 was estimated at 4,263,042 oz. The estimates made in London of the whole amount of gold exported from Victoria and New South Wales up to the close of 1852 gave for the former a total value of £16,000,000, and for the latter £3,500,000; or for 15 months nearly four times what the annual production of the world was supposed to be five years previously. The richest and most extensive gold fields of Australia are in the colony of Victoria, where the area of the mining region is about 725 sq. m. This is divided into the mining districts of Ballarat, Beechworth, Sandhurst, Maryborough, Castlemaine, and Ararat. In Australia, as in California, gold is directly obtained from three distinct sources, viz.: shallow placers, deep diggings, and quartz veins. The estimated number of quartz veins in Victoria is about 2,000. According to Selwyn, "these veins, traversing lower palæozoic strata and associated with granitic and igneous rocks, are, so far as at present known, the primary source of the whole of the gold raised in Victoria. The thickest and most persistent veins, or lines of reef, are found on the lower or older portions of the series; but the average yield of gold per ton of stone has, I believe, been greater from the thinner veins of the upper beds." The thickness of these veins, which are described as "dikes or reefs," varies from that of a thread to 130 ft. They have a general meridional direction, and are inclined either east or west at angles varying from horizontal to vertical. Frequently they occur in the planes of cleavage, occasionally between those of the strata, and they often

intersect both. These veins have been worked to a depth exceeding 600 ft., and it has been found that the yield does not decrease with increase of depth. Mr. Selwyn has reached the conclusion that at least two distinct sets of quartz veins exist in Australia, one of which is entirely barren, and that they have been formed at two different and remote periods, the barren being the older one. This view is corroborated by the fact, well known to experienced quartz miners in Australia, that in many districts barren and rich quartz ledges are found in close proximity. As this same phenomenon has been noticed in California and the Appalachian gold field, it suggests, according to Blake, the probable existence of quartz lodes of two or more distinct periods in America as in Australia. The greater portion of the gold obtained in Australia is from gravel deposits or placers similar to those in California. They occur in beds of streams, along the banks, and in ancient channels running transversely to the existing drainage of the country. Rich deposits are found under heavy accumulations of stratified tuffs and lavas overlaid with table mountains of basalt. The thickness of the placer deposits varies greatly in different places, ranging from 100 to 400 ft. The ratio of gold obtained from quartz mines to that of placers is indicated by the production of the two kinds in Victoria in 1866, viz., 521,017 oz. of quartz and 958,177 oz. of placer gold. The most productive gold fields of Victoria have been those of Ballarat and Bendigo. The general description of the gold fields of Victoria will apply to those of New South Wales. The alluvial deposits, however, are not so extensive as in Victoria, and the production of the colony has been less. South Australia and Queensland are also gold-producing, but the amount obtained is small. The Australian gold has a higher color and is finer than that from California. Its fineness ranges from 20 to 23·5 carats, the Ballarat gold being of the highest standard. The Ballarat nugget mentioned above, found in 1858, and weighing 2,217 oz. 16 dwts., was exhibited at the Paris exposition of 1867, and valued at nearly £10,000. Gold was first discovered in New Zealand in 1842; further discoveries were made there in 1851, and in 1856 mining operations on an extensive scale were begun. The rock formations and alluvial deposits, which are deep and extensive, are similar to those in Australia.—In the United States there are two extensive auriferous regions or gold belts, one on the Atlantic slope, known as the Appalachian gold field, and the other on the Pacific coast, embracing California and the neighboring states and territories. The Appalachian gold field extends southwesterly from Virginia through North Carolina, South Carolina, and Georgia, and also includes portions of Alabama and Tennessee. The width of the gold range varies greatly; in some places it exceeds 75 m. The metal does not exist in a continuous belt

extending through this region; but there are numerous auriferous tracts, occurring at intervals and generally parallel with each other, though often many miles distant. In North Carolina, from which the greatest amounts of gold have been obtained, there are two principal belts extending across the state in a S. W. and N. E. direction; one through Mecklenburg, Cabarrus, Rowan, Davidson, Guilford, and Caswell counties, and the other through Rutherford, McDowell, and Burke counties. The latter is the more westerly of the two, being from 10 to 20 m. distant from the base of the Blue Ridge; it is also more elevated, while the placer deposits are richer and more extensive than in the E. belt. In Georgia also the range appears to be divided into two belts, which are separated by unproductive rocks. Quartz veins closely resembling those of California are found in these regions. The gold is either free in coarse grains, or in fine particles disseminated in sulphuret of iron or copper. The gold veins of Virginia extend through Fauquier, Culpeper, Louisa, Fluvanna, Buckingham, and a few other adjoining counties. The production at times has been very large, but the veins have been extremely fluctuating in their yield; and though some of these still continue to be worked, their history on the whole is by no means favorable. Though gold has been found in Maryland, Pennsylvania, and Vermont, on the range of the Appalachian chain, it has proved insufficient to justify mining explorations, except over a limited area in Vermont during the year 1859. The veins of the southern gold region are found in various rocks of a granitic character, and in the hornblende rock called diorite, all of which are often in a decomposed condition to the depth of 200 ft. or more. They are also met with in a variety of slates, as talcose, micaceous, chloritic, and hornblende. In North Carolina a belt of such crystalline slates several miles wide is traced through several counties on the E. side of another belt of granite and W. of one of hornblende rock, in all of which the veins are found. In South Carolina the geognostical relations of the gold are very similar. Steatitic strata are met with near the mines, and dikes of intrusive rocks are often found cutting the veins and sometimes disturbing their regularity. The course of the veins is by no means uniform; they run in various directions, and are often tortuous as well as displaced by faults. Their most common general bearing is N. E. and S. W., with a dip toward the N. W. Veins in which the quartz gangue is highly crystalline commonly abound in iron pyrites; as they are explored, pyritous copper is generally met with at some depth. In most instances the gold diminishes with the increase of copper, and the latter metal not proving abundant enough to pay expenses, the mines are at last abandoned. Gold is said to have been discovered in Cabarrus co. in 1799, but until the early part of the present century the gold region of the southern

states attracted no attention. Gold had been gathered to a small extent in various places along the ranges of hills on the E. side of the Appalachian chain, between the Potomac and the Coosa river of Alabama; but there was no regular market for its sale, and no account was kept of the quantities collected. These were altogether of placer gold. In 1825 a gold vein was discovered by Mr. Barringer in Montgomery co., N. C., and attention was directed to this source, which in some instances proved highly productive; but this branch of mining was afterward most successfully prosecuted in Virginia, the coarse gold disseminated through the white quartz being more conspicuous than in the North Carolina veins. In the more broken country of the Carolinas and Georgia also the deposits of the streams were more attractive. In 1824 native gold began to appear in the mint at Philadelphia, and the receipts increased rapidly, so that in five or six years it constituted the chief portion of the supplies of this metal. Up to 1827 North Carolina had been the only state producing gold in notable quantities, and the aggregate amount from 1804 is estimated at about \$110,000. The first mint deposits from South Carolina were \$3,500 in 1829, and from Virginia \$2,500 in the same year. The first deposits of Georgia gold were in 1830 to the amount of \$212,000. In 1837 the production had become so great that a branch mint was established by the government at Charlotte, N. C., and another at Dahlonega, Lumpkin co., Ga., both of which commenced operations the next year. They were suspended in 1861, but in 1869 that at Charlotte was reestablished as an assay office. When the discoveries of gold in California were announced, the placer deposits and many of the veins in the south were abandoned. The total amount of southern gold deposited at the mints and assay offices of the United States, from the opening of the mines to June 30, 1873, was \$1,631,612 from Virginia, \$9,983,585 from North Carolina, \$1,378,180 from South Carolina, \$7,267,784 from Georgia, \$79,018 from Tennessee, and \$211,827 from Alabama; total, \$20,052,006. Of the deposits in 1873, \$2,423 came from Virginia, \$120,332 from North Carolina, \$160 from South Carolina, \$85,437 from Georgia, and \$599 from Alabama.—The existence of gold in California had been known from the time of the expedition of Drake, 1577-'9, being particularly noticed by Hakluyt in his account of the region. The occurrence of gold upon the placers was noticed in a work upon Upper California published in Spain in 1690, by Loyola Cavello, at that time a priest at the mission of San José, bay of San Francisco. Capt. Shelvoke in 1721 speaks favorably of the appearance of the soil for gold, and of the probable richness of the country in metals. The "Historico-Geographical Dictionary" of Antonio de Alcedo, 1786-'9, positively affirms the abundance of gold, even in lumps of 5 to 8 lbs. The favorable appearance of the country for

gold, and of Oregon also, was noticed by Prof. J. D. Dana, and recorded in his geological report of the country. In Hunt's "Merchants' Magazine" for April, 1847, is a very decided statement by Mr. Sloat respecting the richness of the country in gold, made from his observations there the two preceding years; and he confidently predicts that its mineral developments will greatly exceed in richness and variety the most sanguine expectations. In these years the Mormons connected with the army were known to have gathered some gold upon the banks of the streams, and the Mexicans and Indians also. A party of three Americans, two of them Mormons, were on Feb. 9, 1848, at Sutter's mill on the American fork of the Sacramento, near the town of Coloma in El Dorado co., engaged in repairing the race, which had been damaged by the spring freshets, when the little daughter of the overseer, named Marshall, picked up in the race a lump of gold and showed it to her father as a pretty stone. The discovery did not immediately attract much attention; and the Mormons particularly sought to prevent the facts from being made public. The Rev. C. S. Lyman, in a letter to the "American Journal of Science," of March, 1848, says: "Gold has been found recently on the Sacramento near Sutter's fort. It occurs in small masses in the sands of a new mill race, and is said to promise well." The news spread rapidly, and caused an unparalleled tide of emigration to pour in from Mexico, South America, the Atlantic states, and even from Europe and China. (See CALIFORNIA.) In August of that year Governor Mason reported 4,000 men engaged in working gold, and a daily product of the value of \$30,000 to \$50,000. The earlier diggings were mostly deposits resting upon the upturned edges of argillaceous slates, the gold being found entangled in these under the sand and gravel, and also more or less mixed through the superficial layers. A large proportion was picked out by hand at many of the diggings, so abundant were the coarse pieces. Attention was early directed to the gold veins, and in 1851 regular quartz mining was commenced at Spring Hill in Amador co. In 1857 numerous mills, most complete and thorough in their construction, were in operation over a great part of the country; and mines were opened at greater depths than gold is often worked in other countries. A shaft of the Mount Hope mining company in Grass Valley was carried to the depth of 241 ft., reaching the vein at 350 ft. following its slope, and the richness of the veinstone at this depth gave full encouragement to the belief that these repositories were permanent and inexhaustible. Many other mines were worked from 150 to 200 ft. in depth. In California, though gold is found E. of the Sierra Nevada, among the mountains of the coast, and in various other localities, the great gold region is on the W. slope of the Sierra, and extends from about lat. 35° N. northerly

to Oregon, a distance of about 500 m. The average breadth of this gold belt is about 40 m. The principal mining operations have been confined to a central area extending N. and S. about 220 m., between the parallels of 37° and 40°, and embracing Mariposa, Tuolumne, Calaveras, Amador, El Dorado, Placer, Nevada, Sierra, Yuba, Butte, and Plumas counties. According to William P. Blake, gold-bearing veins on the W. slope of the Sierra Nevada occur in or are closely associated with clay states, sandstones, and conglomerates of the secondary period; also in hard and compact granite, in greenstone or dioritic rocks, and in dolomite and metamorphic limestones. In the Coast mountains they are found even in the partially metamorphosed stratified formations of the cretaceous period. The largest and most extensive veins exist in the region of the metamorphosed secondary rocks, varying in width from a few inches to 20 or 30 ft., and generally conforming to the dip and strike of the strata. "The most extensive vein of the state," says Mr. Blake, "and perhaps in the world, is known among the miners as the 'mother vein,' and extends, but with some considerable breaks and interruptions, from Mariposa northwestward for 80 or 100 m., following a zone or belt of Jurassic slates and sandstones, and closely associated with a stratum of dolomite or magnesian rock, often a magnesite, filled with reticulations of quartz veins and charged with pyrites." The chief production of California gold has been obtained from placers. The great placer region extends over the central counties from Mariposa to Butte. The deposits occur not only in the beds of the streams, but also upon the hillsides and tops, where ancient watercourses are supposed to have been. Sometimes they are found under enormous accumulations of sand, clay, gravel, and even of tufa and lava; the smoothly worn stones are thoroughly cemented together, and form a solid conglomerate or "cement;" the auriferous deposits consist of gravel and boulders, varying in size from a grain of wheat to masses weighing many tons. These hills on the W. slope of the Sierra Nevada cover a tract of country in places 50 to 60 m. in width, and rise sometimes to the height of 4,000 ft. They are traversed by numerous streams, whose sources are in the Sierra Nevada. Subject to sudden and extreme freshets from the melting of the snows and from the long continued rains of the wet season, these streams excavate and sweep down the loosely aggregated rocks, and wear deep cañons and gulches, which extend toward the valleys of the Sacramento and San Joaquin. Thus it was the same agency which impressed this peculiar feature upon the topography of the region, and spread the gold from the veins in the hills through the ravines and down into the valleys. Even upon the elevated plains quite to the west of the hills gold is collected in strata of sand and clayey deposits, which cover the surface to the depth of 15 to

30 ft. or more. The clay is often seen to be but partially decomposed slate, still retaining the structure of this rock, which was evidently the matrix of the gold.—The general gold formation of California is found in the neighboring states and territories, the entire territories of the United States west of the Rocky mountains being more or less productive. In many parts of this region valuable mines are already worked, and there is little doubt that some of them may in the future contribute more than California to the general gold production of the country. In Nevada gold has been obtained from the quartz and from placers, but the product of the state has been chiefly derived from the auriferous silver ores of the great Comstock vein, discovered in 1859, which yields about one third gold and two thirds silver. Gold has been obtained from Oregon since 1850, and the recent production has been roughly estimated at about \$2,000,000 annually. It was first discovered in Washington territory on the E. slope of the Cascade mountains in 1858. The gold region was traced along the upper Columbia and its tributaries, and in 1860 it was found on the W. slope of the Bitter Root mountains, now in Idaho. There are gold washings in almost all parts of Idaho; the gold contains more silver than that of California, and averages about .760. In Montana there are extensive placers and quartz veins, on the E. slopes of the Bitter Root mountains, and on both sides of the Rocky mountain chain, at the sources of the Missouri river. In Colorado gold occurs in lodes or fissure veins, in a belt about 50 m. wide, extending over the central portion of the territory N. and S. (See COLORADO.) Gold is also obtained from Utah and Arizona, and is known to exist in Dakota. The auriferous belt of Oregon, and of Idaho, Montana, and Washington territories, extends N. along the slopes of the Rocky mountain chain into British Columbia. The mining of gold in this latter country dates from 1858, though the existence of the metal had been announced in 1856. Gold has been found on the Fraser river from a point about 45 m. from its mouth to its source in the Rocky mountains, a distance of upward of 700 m. by the meanderings of the river. It is also found on many tributaries of the Fraser and on Vancouver island. The fields which have been most extensively worked are in the Caribou district, which lies in the N. bend of the Fraser. N. of this district placers have been discovered on Peace river, and still further N. on the Stickeen, which empties into the Pacific S. of Sitka, near lat. 55°. The metal has also been found above that point, but in small quantities. The greater part of the gold from British Columbia is obtained from shallow placers. The production is sent to San Francisco; it amounted in 1873 to \$1,250,035. (See BRITISH COLUMBIA.)—In the province of Ontario, Canada, gold has been found in small irregular deposits of considerable richness in Madoc. The gangue of the gold was in part a feriferous bitter spar,

and in part a peculiar hydrocarbonaceous coaly matter, the two being associated in the same veins, and alike penetrated by crystalline gold of great purity. The adjacent township of Marmora has since been found to contain gold in quartz veins with mispickel. Though not rich, the ore is abundant, and the deposits there are now worked on a considerable scale. The rocks of this region are crystalline schists, probably of Huronian age; and rich gold-bearing veins have recently been discovered in rocks of the same period N. of Lake Superior, on Lake Shebandowan. For many years the gold-bearing alluvions of the Chaudière and the adjacent region in the province of Quebec have attracted attention, and have yielded more or less gold. It is distributed over a large area, but the official returns in 1869 show a production of only 1,050 oz. from the Chaudière valley, although small quantities are extracted in various other localities in the region. The source of the gold appears to be in part in the adjacent crystalline rocks of Huronian age, and in part in some argillites and sandstones which are perhaps of the lower Cambrian period, but may be more recent. In both of these formations, native gold accompanied with sulphurets occurs in quartz veins, which have not however as yet been systematically worked. In Nova Scotia the auriferous quartz occurs in uncrystalline slates and sandstones, for the most part in interbedded veins. The workings have been on a small scale and very irregular, but the quartz is often of great richness. The official returns from 1860 to 1872 show a yield of 215,871 oz., with a value of £863,484. The produce in 1867 was 27,314 oz., but in 1872 only 13,094 oz.—The gold-producing districts of South America are in Brazil, Chili, and all those countries which lie north of the latter on the line of the Andes. As in Europe and Asia, it is the N. and S. ranges of hills of micaceous and talcose slates, quartz rocks, and granites, which produce this metal. In some instances, as in Peru and Chili, it is obtained from veins commonly worked for other metals as well as gold; but almost universally it is a product of alluvial mines. The yield since the early working of the mines has greatly fallen off, and especially since the commencement of the present century; and South America, from having been the first of the gold-producing countries in the world, has now fallen among those of least importance in this respect. Still it is well known that there are districts of great richness yet comparatively unworked, and which are likely long to continue so from their extreme unhealthiness and the want of means of comfortable subsistence. Such is the country about the head waters of the Atrato, the Magdalena, and the Cauca. Similar causes, as well as the political condition of the countries of Central America, have prevented the development of their resources in this metal, which it is well known follows the Cordilleras northward. On the isthmus of Panama discoveries of images

of gold in the graves of the aborigines point to the existence of productive mines in Chiriqui, the localities of which are not now known. The gold is very generally alloyed with copper; some of it indeed is only 8-carat gold, while in other samples the proportion is 23 carats. The gold of Mexico has been rather a secondary product of its argentiferous veins; but in Oajaca are true gold veins in the micaceous slates and gneiss. The silver ores which contain the gold are often argentiferous galena, the lead being the prevailing metal. A small quantity of gold is annually obtained from Central America, and gold placers are known to exist in Cuba and Santo Domingo. Although gold has been found in many places in Brazil, the most productive mines have been worked in the province of Minas Geraes in the vicinity of Ouro Preto, and in the district of Turyassu, in the province of Maranhão. The large production of Brazilian gold in the 18th century was obtained almost exclusively from the alluvial washings of Minas Geraes; but these became exhausted, and the metal is now obtained from the veins or beds worked by English capital. The gold found in Brazil, instead of being enclosed in regular veins, is disseminated in metalliferous beds. The rock formations are supposed to belong to the palæozoic period.—The total production of gold in the world has never been determined with more than an approximate degree of accuracy. There are no statistics showing the exact annual yield of the different gold-producing countries, and the amount produced has been subject to computations by different authorities, whose results have presented no little variance. It is true that in each country an accurate record is kept of the amount coined, and of the exports and imports, but these results only indicate approximately the extent of the production. In 1830 it was estimated that for the preceding 19 years the average annual production of the precious metals had fallen off about \$31,000,000 from what it had been before that time, the estimated product being as follows:

COUNTRIES.	Before 1810.	After 1810.
Europe and Asia	\$4,000,000	\$5,000,000
Indian archipelago	2,980,000	2,980,000
Africa	1,000,000	1,000,000
America	47,000,000	15,000,000
Total	\$54,980,000	\$23,980,000

By the estimate of M. Chevalier, in his work on money, the total amount of gold and silver existing in various forms in 1848 appears to have been £1,727,000,000, or \$8,500,000,000, of which one third was supposed to be gold. The annual product of this metal from 1800 to 1850 had been £3,258,000. By other authorities the whole amount of gold coin and bullion in Europe in 1847 was estimated to be about £250,000,000, and in the world in 1850 £600,000,000. According to Phillips, the annual production at the beginning of the century was

about 53,940 lbs. troy, of which New Granada furnished 23 per cent., Brazil and southern Asia 18 per cent. each, Chili 13, Mexico 8, Austria 6, and Peru 4 per cent. In 1860 the production had increased to 585,370 lbs. troy, of which the chief countries contributed in the following ratio per cent.: Australia, 37; California and neighboring states and territories, 31·9; Russia, 11·3. In 1865 the yield amounted to 559,587 lbs. troy, of which 37·5 per cent. was the product of California and the neighboring states and territories, 27·9 of Australia, and 12·4 of Russia. The following approximate statement of the value of the gold produced in the principal gold-producing countries in 1867 is given by Blake in his "Production of the Precious Metals:—"

COUNTRIES.	Production.	Ratio per cent.
California	\$25,000,000	
Nevada	6,000,000	
Oregon and Washington	8,000,000	
Idaho	5,000,000	
Montana	12,000,000	
Arizona	500,000	
New Mexico	800,000	
Colorado	2,000,000	
Utah, Appalachians, and other sources.	2,700,000	
Total United States	\$58,500,000	43·23
British Columbia	2,000,000	
Canada and Nova Scotia	560,000	1·96
Mexico	1,000,000	·76
Brazil	1,000,000	
Chili	500,000	
Bolivia	800,000	
Peru	500,000	4·05
Venezuela, Colombia, Central America, Cuba, and Santo Domingo	8,000,000	
Australia	81,550,000	24·14
New Zealand	6,000,000	4·10
Russia	15,500,000	11·67
Austria	1,175,000	
Spain	8,000	
Italy	95,000	1·74
France	80,000	
Great Britain	12,000	
Africa	900,000	
Borneo and East Indies	5,000,000	3·83
China, Japan, Central Asia, Roumania, and other unenumerated sources ..	5,000,000	3·83
Total	\$130,650,000	100·00

The production of Australia above given is thus distributed by Blake: Victoria, \$26,510,000; New South Wales, \$4,500,000; Queensland, \$400,000; South Australia, \$140,000. Since about 1850, by far the greater portion of all the gold obtained in the world has been the product of the Australian mines and those on the Pacific coast of the United States. The extent of the Australian production is indicated by the following table, from the official "Statistical Abstract of the several Colonial and other Possessions of the United Kingdom," giving the value of the exports of bullion and coin from New South Wales and Victoria, from the opening of the mines. It should be observed, however, that it does not represent the exact production of each colony. The coin was issued from the branch of the royal mint at Sydney, New South Wales. A branch mint was established at Melbourne, Victoria, in 1872.

YEARS.	NEW SOUTH WALES.		VICTORIA.	
	Exclusive of coin.	Coin.	Exclusive of coin.	Coin.
1851...	£470,836	.....	£498,777	.....
1852...	2,660,945	.....	6,135,723	.....
1853...	1,751,172	.....	8,644,522	.....
1854...	773,209	.....	8,255,550	.....
1855...	209,250	.....	10,904,150	.....
1856...	138,007	£13,144	11,943,453	.....
1857...	187,249	914,199	10,987,591	£251,556
1858...	98,430	1,411,251	10,107,836	605,673
1859...	215,941	1,488,833	9,122,087	1,304,992
1860...	298,668	1,579,920	8,624,860	565,430
1861...	259,937	1,720,826	7,869,758	1,210,528
1862...	517,105	2,467,164	6,685,192	918,999
1863...	587,920	1,774,134	6,520,957	1,169,471
1864...	304,955	2,647,516	6,206,237	1,029,872
1865...	441,006	2,325,544	6,190,311	809,269
1866...	581,933	2,516,487	5,903,957	951,493
1867...	544,661	2,041,338	5,738,993	671,986
1868...	852,616	1,771,005	7,543,197	507,602
1869...	578,260	2,184,612	6,804,179	684,319
1870...	672,254	1,206,569	6,119,782	577,540
1871...	601,250	1,724,088	6,590,962	847,513
1872...	731,120	1,656,131	5,197,340	.....
Total.	£18,016,774	£29,746,556	£161,541,417	£12,317,558

The exports from New Zealand began in 1857, and to the beginning of 1872 had amounted to £24,402,149. They increased from £40,084 in 1857 to £2,897,412 in 1866, then gradually decreased till 1870, when they amounted to £2,163,910, but in 1871 increased again to £2,788,368. The accurate determination of the amount of gold produced in the United States since the discovery of this metal in California is not practicable. As J. Ross Browne, W. P. Blake, R. W. Raymond, and others have shown, neither the manifests of export, nor the mint receipts, nor the bullion shipments of the express companies, nor any direct combination of these data, will give the required amount. This is particularly the case with regard to earlier years. The following table, compiled by R. W. Raymond, United States commissioner of mining statistics, is offered as an approximate estimate, the result of careful study of numerous treatises and partial statistics, in the light of much personal observation of the principal producing districts. Down to 1862 it follows the table compiled by J. Arthur Phillips, and published in his "Gold and Silver." From 1862 to 1866 the production of California is calculated by deducting from the express receipts of uncoined treasure at San Francisco, from "the northern and southern mines," the receipts from Nevada, and adding 10 per cent. to the remainder, to cover amount shipped in private hands. From 1866 to 1872 inclusive the reports of the United States mining commissioner have been followed as a general authority; but as these do not separate the product of gold from that of silver, the division has been made by estimate, based on the known conditions and relations of the industry of different localities. The figures for 1873 are based on the express shipments, with arbitrary allowances for product otherwise transported. Under the head of "Other States and Territories" is included the product of gold

from Oregon, Washington, Idaho, Montana, Colorado, &c., and one third the product of the Comstock lode in Nevada, that being the average proportion of gold by value in the Comstock bullion. The values are given in United States gold coin.

ESTIMATE OF GOLD PRODUCT OF THE UNITED STATES SINCE 1847.

YEARS.	California.	Other states and territories.	Total.
1848.....	\$10,000,000	.....	\$10,000,000
1849.....	40,000,000	.....	40,000,000
1850.....	50,000,000	.....	50,000,000
1851.....	55,000,000	.....	55,000,000
1852.....	60,000,000	.....	60,000,000
1853.....	65,000,000	.....	65,000,000
1854.....	60,000,000	.....	60,000,000
1855.....	55,000,000	.....	55,000,000
1856.....	55,000,000	.....	55,000,000
1857.....	55,000,000	.....	55,000,000
1858.....	50,000,000	.....	50,000,000
1859.....	50,000,000	.....	50,000,000
1860.....	45,000,000	\$1,000,000	46,000,000
1861.....	40,000,000	3,000,000	43,000,000
1862.....	34,700,000	4,500,000	39,200,000
1863.....	30,000,000	10,000,000	40,000,000
1864.....	26,600,000	19,500,000	46,100,000
1865.....	28,500,000	24,725,000	\$53,225,000
1866.....	25,500,000	25,000,000	50,500,000
1867.....	25,000,000	26,725,000	51,725,000
1868.....	22,000,000	26,000,000	48,000,000
1869.....	22,500,000	27,000,000	49,500,000
1870.....	25,000,000	25,000,000	50,000,000
1871.....	20,000,000	23,500,000	43,500,000
1872.....	19,000,000	17,000,000	36,000,000
1873.....	17,000,000	19,000,000	36,000,000
Total.....	\$955,500,000	\$254,950,000	\$1,240,450,000

Other authorities have made the production of California in recent years somewhat larger, as will appear by reference to the article CALIFORNIA.—It is estimated that about three fourths of the gold produced is used for coinage, and about one fourth in the arts. Thus, estimating the entire product of the world in 1873 at \$100,000,000, it is supposed that the consumption in the arts, which has greatly increased in recent years, approximated \$25,000,000. There has also been a recent increasing demand for gold for coinage, attributed to the fact that several countries which formerly used gold and silver as the double or alternate standard of value, have reformed their monetary laws, and adopted the gold standard, that metal being less variable than silver. Among the countries which have recently made this change are the United States, Germany, Denmark, Sweden and Norway, and Japan. Great Britain adopted the gold standard in 1816. France, Belgium, Italy, Switzerland, and Greece still adhere to the double standard. The total gold coinage of the world from 1848 to 1872 has been stated in round numbers at £602,116,000. Of this amount France coined £259,801,000, the United States £185,579,000, England £123,608,000, and Australia £32,128,000. According to the latest report of the director of the mint, the entire gold coinage of the United States to June 30, 1873, amounted to \$816,905,878, in addition to \$285,358,663 manufactured into bars, making the total issue from the

mints and assay offices \$1,102,264,541. (See Coins.) Of this amount coinage to the value of \$35,249,337 and bars valued at \$20,495,616 were issued during the year ending June 30, 1873. The amount of gold of domestic production, exclusive of coins, deposited at the various mints and assay offices of the United States from their establishment to June 30, 1873, with the sources of production, has been as follows:

SOURCE.	VALUE.	SOURCE.	VALUE.
Virginia.....	\$1,681,612 78	Washington territory....	\$71,662 41
North Carolina.....	9,983,555 58	Idaho.....	18,889,755 84
South Carolina.....	1,378,180 77	Utah.....	198,827 61
Georgia.....	7,267,784 76	Nevada.....	1,140,067 94
Tennessee.....	79,018 69	Wyoming.....	153,646 18
Alabama.....	211,827 79	Dakota.....	5,760 00
New Mexico.....	911,171 27	Sitka.....	897 64
California.....	640,080,657 59	Vermont.....	8,904 97
Nebraska.....	27,026 96	Parted from silver.....	5,264,224 78
Kansas.....	955,867 44	Contained in silver.....	111,736 58
Montana.....	38,982,493 21	Refined gold.....	76,285,912 80
Oregon.....	20,574,914 27	Other sources.....	9,874,113 22
Colorado.....	253 53		
Maryland.....	1,089,074 03		
Arizona.....	320 89		
N. Hampshire.....			
		Total.....	\$41,529,129 23

The localities given in this table are merely those from which the mint deposits were declared or inferred to come; hence they do not represent correctly the actual origin of production. A considerable amount, for example, is attributed to Kansas, which really produces no gold. The gold coinage of Great Britain and Australia for 10 years has been as follows:

YEARS.	England.		Sydney, Australia.	
	£	s. d.	£	s. d.
1863.....	6,607,456	5 4	1,876,962	9 10
1864.....	9,535,597	17 6	2,880,663	4 8
1865.....	2,867,614	4 1	2,859,561	13 9
1866.....	5,076,676	14 6	2,955,732	8 2
1867.....	496,897	17 11	2,492,853	15 8
1868.....	1,653,884	8 0	2,345,728	8 1
1869.....	7,872,204	17 9	1,819,388	2 2
1870.....	2,318,354	13 11	1,248,298	1 9
1871.....	9,919,656	1 2	2,870,418	13 1
1872.....	15,261,441	15 10		
Total.....	60,608,815	1 0	20,344,611	16 4

The exports of domestic gold from the United States during the year ending Dec. 31, 1873, amounted to \$55,178,229 in coin, and \$12,754,257 in bullion.—GOLD MINING. Gold occurs principally in metallic form, as threads, scales, spangles, films, grains, monometric crystals, nuggets, &c. Such native gold always contains from 1 to 40 per cent. silver, and often also small quantities of iron, copper, mercury, palladium, platinum, or iridium. Gold ores proper are rare; the undoubted species are tellurides. More commonly gold occurs associated with other minerals, chiefly (in decomposed ores) the oxides of iron, and (in solid ores) iron and copper pyrites, galena, blende, mispickel (all of which may be auriferous), bismuth, stibnite, magnetite, hematite, various spars, and quartz. It is believed by many that auriferous pyrites often contains its gold in chemical combination with antimony, arsenic, or sulphur; but this is probably not the case with all py-

rites, or with all the gold in any variety of pyrites. Gold is classified further as quartz gold (found in veins, &c.), and wash gold (found in placers, gravel and cement deposits, &c.). The methods of extraction are mechanical, chemical, or both, according to circumstances. Mechanical methods involve the agency of air or water. Air separation is the rude process of winnowing, occasionally practised in localities where water is wanting. The dry pulverized material is repeatedly thrown into the air, allowing the wind to carry off the lighter portions, the remainder being caught as it falls in a hide or blanket, or a shallow wooden basin called a *batea*. The process is concluded by blowing the last residuum with the mouth. Washing is the almost universal method of mechanical separation. In exploring for gold, the earth or pulverized rock suspected to contain it is washed on the blade of a shovel, or in an iron pan, wooden *batea*, or horn scoop. The operation is commonly called panning. It consists essentially in stirring and shaking under water the contents of the vessels employed in such a way as to suspend the finer earthy particles and allow them to escape over the edge, while the gold, with the larger stones or lumps of clay, remains behind. The stones are removed with the fingers, and the lumps of clay are rubbed between the hands and reduced to a slime, the process being skillfully continued until nothing is left except gold and heavy black sand, usually titaniferous iron, which accompanies native gold in most localities and cannot be separated by washing. When perfectly dry, a part of it can be removed by blowing and a part by the magnet. It is common to melt the finer dust with fluxes and collect it in buttons. Quicksilver may also be introduced in panning, to take up and secure the fine gold. The cradle, or rocker, is an apparatus somewhat resembling a child's cradle. The box is usually about 40 in. long and 20 wide, and from 15 in. to 2 ft. high at the upper end, upon which is set a hopper or riddle, a box 20 in. square and 6 in. deep, having a bottom of sheet iron perforated with half-inch holes. Under the riddle is placed an inclined apron of canvas, and across the bottom of the main box are nailed two bars or riffles, about three fourths of an inch high. In washing, the dirt is shovelled into the hopper, and the workman lades water upon it with one hand, rocking the cradle with the other. The sheet-iron bottom retains the larger stones; the disintegrated earth, passing through the riddle, falls upon the apron, which carries it to the head of the cradle box, whence it flows along the bottom and escapes at the lower end, leaving behind the riffle bars the gold, black sand, and heavier particles of gravel, which are cleaned up two or three times a day. This apparatus is both slow and wasteful in operation; but it is cheap and portable, and requires little water, since the same water can be used in it over and over again. The long tom is a wood-

en trough, about 12 ft. long, 20 in. wide at its upper end, and 30 in. at the other. It terminates below with an inclined riddle of punched sheet iron, through which the material is carried by a stream of water entering at the other end, and falls upon a riffle box below. A fresh supply of dirt is continually shovelled in at the head of the trough. This arrangement works faster than the rocker, and is not so liable to become packed with sand; but the sluice, which has now generally superseded it, is capable of washing still greater quantities and with less loss of gold. This is generally a long inclined wooden trough, into which the dirt is shovelled, and through which a rapid stream of water continually flows. The ordinary sluice is a series of rough wooden boxes, each 12 ft. long, 16 by 20 in. wide, and 10 in. to a foot deep. The grade is commonly 10 to 18 in. on each box. False bottoms are employed to retain the gold and prevent the wearing out of the boxes. Sluices are sometimes paved with stones or wooden blocks, in the crevices of which the gold is caught and retained. Riffles are also inserted, and quicksilver is very generally employed to assist in catching the gold. The dirt or gravel containing gold is shovelled into the sluices at the head of the series. Mercury is usually poured, an hour or two after the commencement of sluicing, into the head of the apparatus, and smaller quantities are also introduced at various places along the boxes. When the gold is exceedingly fine, amalgamated copper plates are sometimes set in the sluices, and are considered as effective for saving fine gold as an equal surface of pure mercury, while they are both cheaper and more easily managed. Another arrangement for obtaining fine gold consists in allowing a current carrying suspended gold, sand, &c., to pass over tanned hides, laid with the hairs directed against the course of the stream, or over rough baize or blanket, such as is now manufactured for the purpose in California. The blankets are frequently removed and washed in tanks. Where skins are used, as in Brazil, they may be dried and beaten over a cloth, placed to receive the fallen particles. Sluice washing is generally carried on during the day only; but when water is abundant and cheap, the work may be continued throughout the whole twenty-four hours. The sluices are cleaned up once a week, or more seldom, according to the rate at which gold and amalgam accumulate. The amalgam and mercury taken from the sluice are panned, to separate them from sand, &c., and then strained through buckskin or canvas to remove the liquid quicksilver. The auriferous amalgam is removed from copper plates by first warming and then scraping them. This, together with the solid amalgam from the strainers, is retorted; the quicksilver passing over from the retort is condensed in water and thus recovered; while the gold is left in the form of a light yellow porous mass, called retort gold, and usually constituting

35 to 40 per cent. of the weight of amalgam retorted. The length of the sluices employed in this process is limited only by the cost of their construction and maintenance, and the control of the necessary grade. Ground sluices are natural gullies, answering the purpose of wooden sluices in localities where water is abundant for short periods only, and the construction of permanent sluices would not be judicious. In river mining, the current of a stream is turned aside, and sluices are erected in its bed for washing the dirt there accumulated. In beach mining, as carried on along the northern part of the California coast and the southern part of the Oregon coast, the sands on the seashore are explored, and certain portions of them, which are found to be sufficiently auriferous, are transported to some neighboring stream and washed. The origin of this gold is the natural concentration by tides and currents of a bluff of auriferous sand, which in stormy weather is undermined by the waves. The position of the deposits is frequently changed, and mining must therefore be carried on in a new place every day.—Hill diggings and bank diggings are names which explain themselves. Many deposits of auriferous clay and gravel have been subsequently overlaid by barren alluvium; and the ordinary operations of shovelling or blasting would be too expensive for the removal of such enormous masses of unprofitable material. Tunnels and drifts are frequently employed for the purpose of extracting the richer strata. They are particularly necessary in those deep placers in which the drift materials are united by silicious or calcareous matter, constituting a hard, solid cement. This material is usually mined by drifting, and, if too hard for sluicing, is subjected to a treatment similar to that employed for quartz gold. Water for sluicing operations is frequently brought from great distances through canals, ditches, or flumes, the proprietors of which sell the water to miners at so much the miners' inch, a miners' inch being in most localities the quantity flowing in a given time through an aperture one inch square under a head of six inches.—The celebrated hydraulic process, invented in Placer co., Cal., in 1852, consists in washing down the whole surface and underlying mass of auriferous deposits, preparatory to sluicing. This is effected by streams of water under great hydraulic pressure. The first apparatus of the kind had a head of 40 ft. From a barrel situated this distance above the mining claim the water was drawn through a hose 6 in. in diameter, made of common cowhide and ending in a four-foot tin tube, the nozzle of which was one inch in diameter. From this simple beginning has grown in 20 years one of the most remarkable mechanical industries of mining. Hundreds of miles of ditches, canals, and flumes are now employed in conducting water for these operations from the high streams of the Sierra; canvas and iron hose have replaced the original

cowhide; blasts of from 5 to 50 tons of powder at a time are fired, to prepare the ground for the action of water; nitro-glycerine and the diamond drill are used in running preparatory tunnels for drainage; chasms of 1,000 ft. in vertical depth are successfully crossed by huge iron pipes, to convey water to isolated points, thus obviating the ancient high, costly, and perishable flumes; and from ingeniously contrived and regulated nozzles streams as much as 6 in. in diameter are discharged under pressures sometimes exceeding 400 ft. of hydraulic head, with a velocity of 140 ft. and upward per second, delivering more than 1,600 lbs. of water in that unit of time. The water issuing from the nozzle seems to the touch as rigid as a bar of steel, and strikes the gravel bank in the same cylindrical, condensed shape, boring into it with immense power. The heavy boulders are thrown about like pebbles; and the clay, earth, and gravel, disintegrated by the torrent, are swept along into the system of sluices. It has been estimated that, taking the miners' wages in California at \$4 per day, the cost of handling a cubic yard of gravel would be nearly as follows: in the pan, \$20; in the rocker, \$5; with the long tom, \$1; by hydraulic process and sluices, 5 cts. This method has rendered valuable many California placers that were esteemed worthless or exhausted; and its employment would doubtless revive the importance of abandoned gold fields in other parts of the world.—Quartz gold (that is, gold contained in veins, whether native in the quartzose or other gangue, or associated more or less intimately with metalliferous minerals) is extracted in most cases by first pulverizing the material, and then washing and amalgamating. Stamp mills, iron rollers, revolving plates, drums containing iron balls, Chilian mills, arrastras, and jaw crushers are among the machines employed in pulverizing rock. The arrastra consists of a circular pavement of stone, about 12 ft. in diameter, surrounded by a rough curb and forming a kind of tub about 2 ft. in depth. An upright shaft, working on a pivot in the centre of this circle, carries arms to which large stones or mullers are attached by chains or thongs. The arms, being revolved by horse or mule power, drag the mullers over the pavement, upon which the ore, previously broken into pieces of about the size of pigeons' eggs, is distributed. Water is added from time to time, until the quartz has become reduced to a finely divided state, and the contents of the arrastra assume the consistency of thick cream. Quicksilver is then sprinkled over the surface, and the grinding is continued until amalgamation is complete. An ordinary twelve-foot arrastra will grind and amalgamate 450 lbs. of quartz in about seven or eight hours. The amalgam is obtained by diluting and agitating the mixture, and allowing the turbid liquid to run off. The arrastra is slow in operation and wasteful of power, but an excellent amalgamator. Hence the

principle has been very generally adopted in amalgamating, while the preliminary pulverization is effected by other machinery. The Chilian mill consists of a stone or iron basin, around which one or two vertical wheels or runners, frequently of granite, are made to travel. It is generally considered less efficient for amalgamation and scarcely more so for crushing, while it is more expensive to construct than the arrastra. Jaw crushers, of which Blake's well known stone breaker is the type, are widely employed for the preliminary reduction of rock to a size suitable for rollers or stamp mills. Stamping is usually regarded as the most economical and efficient means of pulverizing the ore. The mills constructed for this purpose are run by steam or water power, with the exception of occasional rude contrivances in which single stamps have been operated by horse power, and of the experiment now making, it is believed for the first time, in the island of Arruba, where wind is to be employed as a motive power. The best stamp mills in the world are believed to be those of California and Nevada. These are made up of batteries containing three, four, five, or six stamps each; five is the usual number. Each battery works in a cast-iron box or mortar, in the bottom of which are laid blocks of hardened iron, called dies, to receive the shock of the falling stamps. The broken rock is fed in suitable quantities into the mortar, and crushed between the dies and the stamps. Each stamp consists of a stem, a collar, a stamp head, and a shoe. The stem was formerly made of ash or other hard straight-grained wood, about 6 in. square, to the lower end of which a square iron stamp head was fastened. At present, in California, stems of 3 or 3½ inch round iron, some 12 ft. in length, are universally employed. The collar is secured upon the upper part of the stem, and forms a projection 3 or 4 in. wide, under which the cam of the horizontal driving shaft catches and lifts, and at the same time turns, the stamp. The stem fits below into the stamp head, a cylinder of tough cast iron, furnished on its lower face with a hard iron shoe, which can be replaced when worn out. The stamps are dropped 6 to 12 in., at the rate of from 25 to 90 drops per minute. Water flows into the mortar with the ore; and the finely divided product is splashed by the stamps through screens of wire cloth or perforated sheet iron, set in the walls of the mortar. Loose quicksilver and amalgamated copper plates are sometimes used inside the mortar. The mixture of crushed ore and water is differently treated in different places for the extraction of gold. Sometimes it is run over amalgamated copper plates; sometimes it is first concentrated by means of blankets; sometimes it is introduced into pans, somewhat on the principle of the arrastra, or into various other ingenious forms of apparatus, for the purpose of amalgamation. In the most suc-

cessful establishments, the current conveying the sediments is led through a succession of apparatus, each machine, sluice, or other contrivance being intended to catch a portion of the gold carried past the preceding one. The refuse finally escaping is called tailings, and usually contains: native gold, so finely divided that it has been swept by the current through all the apparatus employed; minute particles of amalgam and "floured" quicksilver, carried off in the same way; coarser particles of gold adhering to fragments of rock; and, finally, gold associated mechanically or chemically with iron or copper pyrites, blende, galena, and mispickel. The tailings are usually run into reservoirs, allowed to settle, and then stored in heaps. Sometimes these heaps are again amalgamated, with or without a preceding concentration by washing. It has been found in many instances that some kinds of pyrites slowly decompose by exposure and thus set free fine gold. The metallic sulphurets are, however, in many cases, separated from other tailings by washing immediately after the first amalgamation of the ore, and various devices have been employed for the treatment of such concentrated pyrites, which is often the richest in gold of all the constituents of the vein stuff. Following the analogy of natural decomposition, it has been repeatedly attempted, by roasting the pyrites in reverberatory furnaces, to drive off the sulphur and oxidize the metallic bases, so as to obtain a product containing fine particles of free gold. The objection brought against this treatment, that the vapors of roasting carry off mechanically fine particles of gold, seems to be ill-founded. More serious objections are the cost of the roasting process, and the circumstance that the roasted product does not contain the gold in a condition suitable for amalgamation. It is supposed that the particles when thus artificially and rapidly reduced become coated with a film of oxide of iron, preventing the intimate contact with quicksilver upon which amalgamation depends. Very careful roasting in cylinders, with the addition of salt, is said to have obviated this difficulty; but the question of expense remains.—The present methods of treatment for pyritous gold ores are: 1, the extremely fine pulverization of the ore, liberating, as far as this is mechanically possible, the particles of gold; 2, the amalgamation of the pyritous residues in pans, with the addition of chemicals intended to facilitate decomposition; 3, chlorination; 4, smelting. The chlorination process was introduced by Prof. Plattner of Freiberg, Saxony, for the treatment of auriferous residues in Silesia. As improved by Deetken, it has been employed in this country for about 15 years. The principle involved is the transformation of metallic gold by means of chlorine gas into soluble chloride of gold (the *aurum potable* of the alchemists), which can be dissolved in cold water and precipitated in the metallic state by

sulphate of iron. This precipitate may then be filtered, dried, and melted with suitable fluxes, to obtain a regulus of malleable gold. It is necessary that all the gold, and if possible nothing else, shall be obtained in the final solution. If this is secured, the precipitation and melting are easy. To render the gold in the ore accessible in a metallic state to the chlorine gas, and at the same time to convert the base metals into oxides which will not unite with the chlorine, the raw ore is finely pulverized and (if sulphurets or arseniurets are present) roasted. The cost of this treatment, amounting in the Pacific states and territories to from \$12 to \$25 a ton, excludes its use for low grade ores; and hence it cannot supersede the stamp mill and amalgamation process, though it is acknowledged to be metallurgically the most complete method of gold extraction on a large scale. Ores containing iron, copper, gold, and silver may be roasted and deprived of their copper and iron by leaching with dilute sulphuric acid, of their silver by boiling with concentrated sulphuric acid, and of their gold by treating the auriferous residuum with aqua regia. If lead is present, the whole residuum after the removal of copper must be melted with lead and cupelled. This process is not now used in the United States, though it is recommended by high authority. Telluric ores are treated in Transylvania in a somewhat similar way. The smelting processes for the extraction of gold are the same as those for silver. Since the two minerals always occur in nature together, the final result of smelting is argentiferous gold or auriferous silver. The separation of the two metals is effected: 1, by dissolving the silver in nitric acid or boiling sulphuric acid, which leaves behind a brown powder of gold; 2, by treating the alloy with aqua regia, in which gold is dissolved as chloride, while the chloride of silver is but slightly soluble; or 3, by passing a current of chlorine gas through the alloy while in a melted state. For separation with nitric acid, the alloy should contain $2\frac{1}{2}$ parts of silver to 1 part of gold. For the separation with sulphuric acid, the best results are obtained with alloys containing not much less than 3 or more than 4 parts of gold in 16 parts, the remainder being silver and copper. It is usually necessary in treating native gold to melt it with at least 2½ times its own weight of silver, and then to separate by the action of acids the silver thus added, and also that originally contained in the gold. It is said that the chlorine process effects a complete separation of the silver in one operation, at the time the gold is melted, and thus saves much time, material, machinery, and interest on capital. Nitric acid and sulphuric acid processes are used in the mints of the United States, and the chlorine process is employed in some of the British colonial mints.—Among the most recent authorities on this subject are: Phillips, "The Mining and Metallurgy of Gold and Silver"

(London, 1867); J. Ross Browne, "Mineral Resources of the Pacific Slope" (New York, 1868); Blake, "Production of the Precious Metals" (New York, 1869); R. W. Raymond, "Silver and Gold" (New York, 1873). See also Selwyn's "Notes on the Physical Geography, Geology, and Mineralogy of Victoria" (Melbourne, 1866), and the reports on the geology of California by J. D. Whitney.

GOLD-BEATING, the process of hammering gold into thin leaves. It is not known what were the methods in use by the Egyptians, Greeks, and Romans for obtaining the thin leaves they manufactured; but it is probable that they did not differ essentially from the simple processes now practised, which were brought to their present perfection by continued experience and the application of a moderate degree of skill. The earliest recorded notice of the mode of preparing gold leaf is that of the German monk Theophilus, in or before the 12th century, from which it appears that parchment was used as a covering to the gold during the hammering, and the leaves were prevented from sticking by the application of red ochre or chalk. When the substance called gold-beaters' skin (French, *baudruche*) was first used for the production of the finest qualities of gold leaf is not known. This material, essential to the manufacture, is derived from the cæcum of the ox, which, being well cleaned, is doubled together, the two mucous surfaces face to face, in which state they unite firmly. The membrane is then treated with solutions of alum, isinglass, white of eggs, &c., and sometimes with creosote, and, being beaten between folds of paper to expel the grease, is finally pressed and dried. The leaves thus obtained, each $5\frac{1}{2}$ in. square, are made up into moulds, each composed of 850 leaves. The cæca of 500 oxen are required for a single mould.—Various qualities of gold are employed for gold leaf. The common coin answers a very good purpose, and different shades of color are obtained, according to the proportions of silver and copper in the alloy. Chemically pure gold makes leaves well adapted for gilding which is to be exposed to the weather, as they are less liable to tarnish or change color; these are remarkable for their property of adhering as they touch each other. Deep red colors are obtained by alloys of 12 to 16 grains of copper to the ounce of gold; silver, if added when too much copper is present, lessens the malleability of the alloy. Medium colors, as orange, lemon, &c., result from the alloy of 12 to 20 grains of silver and 6 to 8 of copper to the ounce; and pale colors from alloys of from 2 to not less than 20 pennyweights of silver to the ounce, without copper. The gold, being melted in a crucible with a little borax, is cast into ingots, commonly 3 or 4 in. long, $\frac{3}{4}$ in. wide, and about $\frac{1}{2}$ in. deep, and weighing about 1,000 grains each. The ingots are annealed in hot ashes to remove the grease derived from the moulds and increase the malleability of the

metal. The French then forge the metal upon an anvil with small hammers, reducing its thickness to one sixth of an inch, and at the same time exposing it to frequent annealings; but this is omitted by the English, who submit it at once to the lamination process, or rolling between two rollers of polished steel, which are adjusted so as to be brought successively nearer together. This operation, which formerly reduced the gold to a ribbon an inch wide and $\frac{1}{8}$ of an inch thick, is by improved machinery now extended till the gold is reduced to a sheet a little more than $\frac{1}{100}$ of an inch thick, an ounce making 10 ft. in length by $1\frac{1}{2}$ in. in width. The gold, again annealed, is next cut up into inch squares, the weight of each being about 6 grains. About 150 of these pieces are piled alternately with leaves of fine calf-skin vellum or of a tough paper manufactured in France for this purpose, each piece being placed in the middle of one of the leaves, which are 4 in. square. A number of extra leaves are added to the top and bottom of the pile, which when completed is called a tool or kutch. This is then slipped into a parchment case, open at two ends, and this into a similar case, so as to enclose the pack on all four sides. The pack is now placed upon a block of marble, set for an anvil, with a ledge around three sides of it, and a leather apron for the fourth side, which is held up by the workman, who proceeds to beat the pack. He wields a 16-lb. hammer, shifting it from one hand to the other without interfering with the regularity of the stroke, also occasionally turning the pack with the same dexterity. The hammer has a slightly convex face, which adds to its efficiency in spreading the gold, and the working of it is made much easier by the elasticity of the pack causing it to rebound. The pack is from time to time bent back and forth to overcome the adhesion between the gold and the vellum or paper; it is also rolled between the hands for the same purpose; and it is occasionally opened to examine the condition of the leaves and properly arrange them. In about 20 minutes' beating the gold is spread to the size of the leaves, covering 16 square inches in place of one inch. The pieces are then taken out, and each is cut into four square pieces, the original 150 pieces being thus increased to 600. These are again packed, this time in gold-beaters' skin, again enclosed in parchment cases, and beaten with a smaller hammer, till they are extended to the size of the skins. This operation requires about two hours. More particular care is given now than before to folding the pack in order to loosen the leaves. When all the gold leaves have expanded to the full size, they are taken out and spread by the breath one by one upon a cushion, where each is cut into four squares by two sharp edges of cane fixed crosswise, and used by pressure downward. To this material the thin leaves do not adhere as they do to a steel blade. The squares are now 2,400 in number. These are once more

packed, making three parcels, and beaten as before for four hours. This part of the process requires the most skill and care from the workman. The skins are the finest, about 5 in. square; the leaves are brought at the end of the operation to 3 or $3\frac{1}{2}$ in. square. In this condition an ounce of gold is made to cover 100 sq. ft. It begins to transmit the rays of light, and, if slightly alloyed, the green rays particularly, but, if highly alloyed with silver, the pale violet rays also. The beating may be continued, and the gold be reduced to the thinness of the specimens noticed in GULDING; but there is no advantage gained in passing the average of the commercial gold leaf, which is about $\frac{1}{100,000}$, or that of the French, which is probably less than $\frac{1}{100,000}$ of an inch thick. The leaves are sorted after the final beating, each one being lifted by a delicate pair of whitewood pincers, and spread out by the breath upon a leather cushion. It is then trimmed down to about $3\frac{1}{2}$ in. square by a square frame of sharp cane, and laid between the leaves of the book in which it is sold. Each book is made to contain 25 gold leaves, and these are prevented from adhering to the paper by an application to this of red ochre or red chalk.—Silver and copper are both beaten into leaves; but their value is not so great as to render it an object to reduce them to anything like the tenuity of gold leaf, if their malleability admitted of its being done.

GOLDBERG, a town of Prussian Silesia, on the Katzbach, 10 m. S. W. of Liegnitz; pop. in 1871, 6,716. It is quaintly built, and has a church dating from the beginning of the 13th century. Cloth and hosiery are manufactured, and there are dye works and distilleries of brandy. The gold mines from which it derived its name are not now worked. A battle was fought here, May 27, 1813, between the French under MacDonald and the Russian reserve under Wittgenstein, and a skirmish (Aug. 23) between the former and Blücher.

GOLD COAST, a part of the coast of Upper Guinea, W. Africa, lying, according to most geographers, between Cape Three Points and the river Volta; but the jurisdiction of the British Gold Coast colony, including the territories ceded by the Dutch in 1872, extends from the river Assinie, lon. $3^{\circ} 18'$ W. to the river Ewue, lon. $1^{\circ} 10'$ E.; area, 16,626 sq. m.; pop. in 1871, 408,070. The shore line, about 330 m. long, is skirted generally by low hills with dense woods in the background, but is flat and sandy at its extremities, with lagoons inland. There are no harbors, and the surf is so violent that vessels are obliged to lie from 2 to 5 m. off the beach. The chief rivers are the Assinie, Ancober, Tenda, Bossum Prah or Prah, and the Volta. The Gold Coast colony proper consists of only the fortified stations and the strip of coast dominated by them; but a protectorate is exercised by Great Britain over all the tribes lying between it and Ashantee. The limits of the protectorate are not clearly defined, but it is generally understood to extend inland about 80

m., the river Prah forming its N. boundary in the longitude of Elmina and Cape Coast Castle. The principal native people inhabiting this territory are the Fantees, but there are a number of smaller tribes, the Achantas, Wassas, Denkiras, Akims, Aesins, Aquapims, Crepees, and others, all under independent chiefs. Little is known of the interior, but the few who have penetrated it speak of its vast forests filled with tropical life, and of green plains traversed by sparkling streams, and its climate is said to be more healthy than that of the coast. There are no roads, the only means of communicating between the villages being by narrow paths, passable only in single file. Beasts of burden are unknown to the natives, who transport all merchandise and produce to and from the coast on their heads. The soil is very fertile, producing all the tropical grains and fruits. Traces of iron are found at several places on the coast, and there are rich gold mines in the interior. In the beginning of the 18th century the Dutch exported annually from Elmina about £250,000 worth of gold dust, but the hostility of the native tribes has now nearly destroyed the trade. The fortified posts of the Gold Coast colony are Axim, Dixcove, and Sekundi, in the Ahanta country, and Elmina, Cape Coast Castle, Anamboe, and Accra, in the country of the Fantees. The French trading station at Assinie has been abandoned since 1870. Axim, about 14 m. W. of Cape Three Points, is one of the healthiest places on the coast, owing probably to the pure water which runs from the neighboring hills in rivulets. All the tropical plants grow to perfection in its vicinity, and many European vegetables have been successfully introduced. It is the only place where rice is raised, and the influences so deadly to live stock at other points do not extend to it. In the country N. of it are rich gold mines, and gold dust, palm oil, and palm kernels were once exported in considerable quantities. The town is commanded by Fort St. Anthony, built in its centre on a precipitous rock 70 ft. high. Dixcove (called Unfuma by the natives), 11 m. E. of Cape Three Points, is defended by a fort, which the Dutch thoroughly repaired in 1867. The town is dirty and unhealthy, from the exhalations of neighboring swamps, which harbor numerous crocodiles. Between Axim and Dixcove are the ruins of the old forts Great Friedrichsburg, Brandenburg, and Dorothea, built originally by the Prussians. Bautri or Boutry, 3 m. E. of Dixcove, a former Dutch settlement which was defended by Fort Batenstein, is now abandoned. Sekundi, the next station, 20 m. from Dixcove, is situated on a point, with Fort Orange on a steep promontory at its end. The environs are fertile, and the country back of it is covered with dense woods. The former Dutch settlement of Chama is 8 m. further E., near the mouth of the Prah. It is commanded by Fort St. Sebastian, originally built by the Portuguese, and still in a fair state of repair, but abandoned on account of the unhealth-

fulness of the locality. The Dutch cultivated here cotton, flax, hemp, coffee, tobacco, and ground nuts, with much success. From Chama to Elmina is about 20 m. Between are the native towns of Kommenda (pop. 4,000), with the ruins of an old English fort; Komnanie (pop. 2,300), with the remains of the Dutch fort Vredenburg; and Ampeni (pop. 4,500). Elmina, called by the natives Odena, the capital of the former Dutch colonies, had a population of 15,000 in 1867. (See *ELMINA*.) Cape Coast Castle, 8 m. E., the capital of the Gold Coast colony (pop. 10,000), derives its name from its fortress built on rocks near the seashore. Behind, on a gentle slope, is the European town, with picturesque houses surrounded by gardens of tropical fruits. Anamboe or Anamabu, 10 m. E. of Cape Coast Castle, and Accra or Akrah, nearly 70 m. further, are the two most easterly fortified settlements on the coast, but there are missionary stations at several intervening points. The slave trade is virtually abolished, but domestic slavery exists to a great extent throughout the protectorate. The principal exports are gold dust, palm oil and kernels, gum, ivory, and monkey skins; the imports are cotton and silk goods, guns, gunpowder, hardware, tobacco, and wines and spirits. The total tonnage of vessels entered and cleared, exclusive of coasting trade, in 1871, was 251,047. The total value of imports for 1871 was £250,672, of which £171,978 were from Great Britain; total value of exports in 1871, £295,208. The chief trade previous to 1872 was with the Ashantees.—Since 1850 the colony, previously under the jurisdiction of Sierra Leone, has had a government of its own, with a governor and executive and legislative councils. It has also judicial, military, ecclesiastical, and educational establishments. The gross amount of public revenue, raised in part by a tax of 3 per cent. on imports, was in 1871 £28,609; gross expenditure, 1871, £29,094. An attempt was made to impose a poll tax of a shilling a head on all the protected natives, which in 1852 produced £7,567; in 1861 it had fallen to £1,552, and since then it has not been levied. The Dutch did not levy any import duties.—The first European nation to establish themselves on the Gold Coast were the Portuguese, who began the fort at Elmina in 1481. In 1637 it was captured by the Dutch, and three years later all the Portuguese possessions on the coast were ceded to them. In 1662 the "Company of Royal Adventurers of England trading to Africa," and in 1672 the "Royal African Company of England," built rival forts and factories near the Dutch company's settlements, which resulted in constant disagreements and quarrels. In the war of 1781 the English captured all the Dutch forts except Elmina. On their restoration by the treaty of Versailles, the states general assumed the government of the colony, but the rivalry continued and frequently led to bloodshed between the negro

tribes of the two jurisdictions. Considering that this unsatisfactory state of affairs was due principally to the positions of the forts of the two nations, which alternated with each other, an agreement was made in 1867 that the boundary line between the colonies should be the Sweet river, a small stream between Elmina and Cape Coast Castle; that all the settlements E. of this point should belong to England, and all W. of it as far as the Assinie river to the Netherlands. In accordance with this treaty, the Dutch ceded Mori, Kormantin, Assam, Bereku, and Fort Crèvecoeur at Accra; the English, Apollonia, Dixcove, Sekundi, and Kommenda, and the protected territories of Wassa, Denkira, and Tufel. The Dutch forts were surrendered to the English without trouble, but the natives resisted the transfer of the English stations to the Dutch. Disturbances ensued, and on Jan. 31, 1867, the Dutch burned Kommenda as a punishment. In 1868 they burned Sekundi in retaliation, and in 1869 Dixcove. The natives became only the more incensed at these measures, and the Dutch government, despairing of peace, agreed, by a treaty ratified at the Hague Feb. 17, 1872, to transfer all its possessions to England, which was formally done the following April. The Danish settlements had previously been ceded to Great Britain (in 1850), so that the latter power now controlled the whole coast. The king of Ashantee, who had been accustomed to draw his supplies of arms and ammunition through the Dutch factories free of duty, objected to the transfer of the forts, which cut him off from access to the coast, and declared that the Dutch had no power to transfer Elmina, which he said belonged to him, the Dutch having paid him a tribute of £300 a year. In January, 1873, the Ashantees crossed the Prah and invaded the protectorate. The protected tribes offered but a feeble resistance, and in June both Cape Coast Castle and Elmina were threatened by a force estimated at 50,000 men. The native king of Elmina aided the Ashantees, and four out of the eight captains of the quarters into which the town is divided refused to take the oath of allegiance. On June 30 the quarter of the native king was bombarded by the fort and destroyed, and in the afternoon of the same day the Ashantees were defeated with a loss of 500 and their general, and withdrew to Effutu, 12 m. distant. In August Takorady was bombarded by the British fleet, Dixcove repelled an attack of the Ashantees, and Axim, where the natives rose against the garrison, was burned. In October Gen. Sir Garnet Wolseley was sent from England to Cape Coast Castle with both civil and military powers. Early in January, 1874, he set out for Koomassie with about 2,000 white troops, building a military road as he went, and the Ashantees fell back before him. The Prah was crossed without opposition. At Amoafu, about 22 m. from Koomassie, a severe battle

was fought on Jan. 31, in which the Ashantees were defeated with heavy loss, including their commander Amanquatia. A second battle took place at Ordahsu, 15 m. beyond, on Feb. 4, the king commanding in person. After six hours the Ashantees fled, and the British entered Koomassie. On the morning of Feb. 6 the town was fired and the troops began their homeward march. A peace was subsequently concluded, the king agreeing to pay an indemnity of 50,000 ounces of gold, to renounce the protectorate, to keep open a road to the coast, and to prohibit human sacrifices.

GOLDEN FLEECE. See ARGONAUTS.

GOLDEN FLEECE, Order of the (Span. *el toison de oro*; Fr. *ordre de la toison d'or*), one of the oldest and most important of the orders of chivalry, founded at Bruges by Philip the Good, duke of Burgundy, on occasion of his marriage with the princess Isabella of Portugal, Jan. 10, 1430, and consecrated to the Virgin Mary and the apostle Andrew. The statutes of the order declare that it takes its name from the golden fleece which the Argonauts went in search of. It is possible that it was founded in memory of Philip's father, John the Fearless, who was held a prisoner in Colchis, and that it was consecrated to St. Andrew because that apostle carried the gospel to the land of the golden fleece. Some suppose that it received the badge in consequence of the important woollen manufactures of the country. The decoration of the grand master is a chain composed of alternate flints and rays of steel, with the golden fleece fastened in the middle. The knights wear a golden fleece on a red ribbon. Its design was to maintain the honor of knighthood and protect the church, and it was sanctioned by Pope Eugenius IV. in 1433 and by Leo X. in 1516. An article of the statutes (published at Lille, Nov. 30, 1431, in the French language) ordained that if the house of Burgundy should become extinct in the male line, the husband of the daughter and heiress of the last sovereign should be grand master of the order. After the death of Charles the Bold (1477) the husband of his daughter and heiress Mary, Maximilian I. of Austria, therefore inherited the grand mastership. During the war of the Spanish succession Charles III. (afterward the emperor Charles VI.) and Philip V., the contestants for the throne of Spain, both claimed this dignity. When the former left Spain he carried the archives of the order with him, and in 1713 celebrated its revival in Vienna. Spain protested against this at the congress of Cambrai in 1724, and it was decided by the treaty of Vienna in 1725 that the regents of both states should be permitted to confer the order with similar insignia, but that the members should be distinguished as knights of the Spanish or Austrian golden fleece. After the death of Charles VI., Maria Theresa in 1741 bestowed the office of grand master upon her husband Francis I., against which Philip V. of Spain protested in the electoral assembly

at Vienna and at Frankfort. At the peace of Aix-la-Chapelle in 1748, France, England, and Holland demanded that the schism should be composed; but as Ferdinand VI. of Spain declared that the order was inseparable from the Spanish crown, the dispute has remained unreconciled, and the order continues in two branches, neither of which recognizes the other. The original device of the order was *Autré nauray* ("I shall have no other"); but Charles the Bold changed it into *Je vay empri* ("I have accepted it"). The statutes ordain that the knights shall recognize no other jurisdiction but an assembly of their order under the presidency of the grand master or of a knight authorized by him, and that they shall have precedence of all persons except those of royal blood. The number of knights, originally 24, was soon increased to 31, and in 1516 to 52. In 1851 the order consisted in Austria of 6 grand crosses, 20 commanders, and 161 knights.

GOLDEN NUMBER, the place of a given year in the lunar cycle. It is used to determine on what day the paschal moon falls, and thus to find Easter day. The mean length of the lunar cycle agrees exactly with 19 Julian years. (See **CALENDAR**, **LUNAR CYCLE**, and **YEAR**.) The new moons were indicated before the reformation of the calendar by means of the lunar cycle, which restores them to the same days of the civil month, and places them on the same days in any two years that occupy the same rank in the cycle. Consequently a table of the full moon's phases for 19 years will serve for any year whatever, when we know its number in the cycle. The year preceding the commencement of our era, when the new moon fell on the 1st of January, is supposed to be the beginning of the cycle, which gives this rule for finding the golden number: Add 1 to the date and divide the sum by 19; the quotient is the number of cycles elapsed, and the remainder is the golden number. When the remainder is 0, the proposed year is the last or 19th of the cycle. The new moons determined in this manner may, however, differ from the astronomical new moons as much as two days, because the sum of the solar and lunar inequalities, compensated in the whole period, may in certain cases amount to 10°, and thereby cause the new moon to arrive on the second day before or after the mean time. The Gregorian calendar rejects the golden numbers, as they are only adapted to the Julian calendar; the suppression of the ten days rendered it necessary to place them ten lines lower, and the century intercalation required them to be changed every century. Their place is supplied by another set of numbers called *epacts*. (See **EPOCH**.)—The golden numbers were introduced into the calendar about the year 530, but were disposed as they would have been if they had been inserted at the time of the council of Nice. It was usual to mark them in the calendar with red or gold.

GOLDENROD (*solidago*, Linn.), the name of numerous plants, whose showy heads of flowers, waving like golden wands, make bright and gay the sides of roads, hills, and gravelly banks in the autumn. A supposed efficacy in the plants suggested to the early botanists the name *solidago*, from Lat. *solidare*, to make firm. Although the general appearance of the racemed or else corymbed heads, which bear the florets, is diverse, yet the flowers themselves differ only from the asters in the smaller heads of (except in one species) yellow flowers. The genus is mostly North American, there being about 80 species, all of which but three or four belong to this country. The most common European species is *S. virgaurea*, with a low, terete, pubescent stem, which branches above; the lower leaves are elliptical, somewhat hairy, acutely serrate, the flower heads in thyrsoid racemes. It grows in thickets and woods, and formerly was much used in medicine. Its



Goldenrod (*Solidago Canadensis*).

principle is astringent and tonic; the leaves and flowers, however, were thought aperient. It occurs in the northern regions of America, but under very dissimilar forms. Of these, a dwarf kind, only a few inches high, with obovate or lanceolate, mostly entire leaves, and a few large flowers, is the variety which Dr. Bigelow calls *alpina*; it occurs in the alpine regions of New Hampshire, of Maine, and of New York, and on the shore of Lake Superior. A second distinct variety is *humilis*, on the rocky banks of western Vermont, Lakes Huron and Superior, and northward; and a sub-variety with larger and broader leaves, the flower heads in ample, compound racemes, the flower rays occasionally white instead of yellow, is to be met with on gravelly banks of streams at the base of the White mountains in New Hampshire. A similar but distinct species is *S. thyroidea* (Meyer), which occurs on the wooded sides of mountains from Maine to

New York and northward. Perhaps the most interesting species is the sweet goldenrod (*S. odora*, Ait.), with a slender stem 2 to 3 ft. high, often reclined; the leaves linear-lanceolate, entire, shining, covered with pellucid dots, which secrete a delicious anisate oil; the flower heads in racemes spreading in a one-sided panicle, the flower rays rather large and conspicuous. It may be occasionally found in rich shady woods. An essence distilled from the leaves has been used to relieve spasmodic pains. One of the earliest indications of the approach of autumn is in the flowers of *S. bicolor*, or white goldenrod, the only species which has white flowers. Next comes into yellow bloom the tall Canadian goldenrod (*S. Canadensis*), and following this, the gigantic goldenrod (*S. gigantea*), and the tall goldenrod (*S. altissima*), names singularly misapplied, as the altitude of both is not unusual. Afterward may be seen *S. arguta* and other species, until the lingering florets upon the downy goldenrod (*S. nemoralis*) indicate the near approach of the cold. The goldenrods generally affect dry and sterile soils, though some are found in bogs and moist places, and range from alpine heights to the very margin of the sea, where may be seen *S. sempervirens*, with its large, thick, shining green leaves, and bold, large-rayed, and conspicuous yellow flowers, and the narrow-leaved (*S. tenuifolia*, Pursh), having very small, crowded heads of inconspicuous flowers. Several species are peculiar to the western states, as *S. Ohioensis* (Riddel) and *S. Riddellii* (Frank.), in moist meadows and grassy prairies; and others, as *S. Drummondii* (Torr. and Gray), upon rocks, in common with more ordinary ones, indicating a wide distribution of the genus.

GOLDEN SEAL. See PUCCOON.

GOLDFINCH (*fringilla carduelis*, Linn.), one of the handsomest of the European *fringillidæ*, valued as a cage bird both for its beauty, its song, and its docility. It is about 5 in. long, with an extent of wings of 9 in.; the forehead and throat are crimson; the loreal space, top of the head, and a semicircular band on the upper neck black; the hind neck and back are umber brown, passing into ochre yellow on the rump; sides of breast and flanks paler, and white below; smaller wing coverts black, secondary rich yellow; most of the quills black with white tips, except the basal half of the outer webs, which are yellow; tail black, white tipped. The female is smaller, with less crimson, pure black, and bright colors in the plumage. Like all caged birds, the goldfinch sometimes shows considerable differences in color. It will pair and produce progeny with the green linnet. Its food consists of the seeds of the thistles, grasses, and herbaceous plants, which it seeks in small flocks. Its song, which is sweet and varied, usually begins in Great Britain about the end of March and continues until July; its flight is quick and buoyant, like that of the linnet. The nest is elaborately made of the usual materials, and

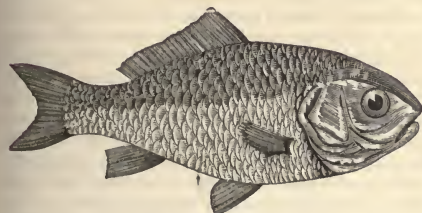
lined with wool and hair; the eggs, about five, are three quarters of an inch long, of a bluish white color, with brown tinges and purplish spots. It remains in Scotland through the winter, though great numbers perish in severe seasons. The goldfinch is easily caught and



Goldfinch (*Fringilla carduelis*).

tamed, and may be taught the notes of other birds and many amusing tricks; it is a great favorite both in England and America as a cage bird.—For the American goldfinches, of the genus *chrysomitris* (Boie), see YELLOW BIRD.

GOLD FISH or **Golden Carp** (*cyprinus auratus*, Linn.), a native of China, but introduced into Europe early in the 17th century. In China gold fish are to be found in almost every house, and are kept either in porcelain vessels or in artificial ponds; wherever known they are prized for their beauty, elegant form, grace of motion, and docility; they are very easily kept alive in small vessels, if due attention be paid to changing the water daily. The usual color is bright orange above, lighter on the sides, and whitish beneath; the scales are large and striated; the pupils are black, and the iris silvery; the mouth is small and toothless; the dorsal fin is single, with the first two rays spinous. The colors vary exceedingly by domestication, and exhibit almost every variety of orange, purple, and silvery; the fins vary considerably, as regards the size of the dorsal and the number of the anals; triple tails are common, in which case the dorsal is frequently absent. The silver fish is a mere variety, and the dark colors are the marks of the young



Gold Fish (*Cyprinus auratus*).

fish. It is found in many ponds in New England, bearing well the severity of the winters, and breeding in great numbers when protected from other fish. Gold fish form one of the most interesting ornaments of private gardens, and are seen everywhere in the basins of the

fountains of large cities in the summer season. Their food is chiefly infusorial animalcules, with bread when in confinement; their flesh is not esteemed as food. The intensity of the colors and several of their external characters are modified by their food, and the new characters are transmitted to the offspring. In artificial ponds they are taught to come to the surface at the ringing of a bell. They will live in foul water, and a long time out of water on account of the loose structure of their gills; in ponds the spawn and young fish are often eaten by their larger comrades; their life may be prolonged to 20 or 30 years, and they will bear great extremes of heat and cold. In common with many fresh-water fish, they are attacked and sometimes destroyed by a parasitic fungus, arising from any diseased surface, and even from the healthy tissue of the gills.

GOLD HILL, a town of Storey co., Nevada, 1 m. S. of the centre of Virginia, and about 190 m. E. N. E. of San Francisco; pop. in 1860, 638; in 1870, 4,311, of whom 2,346 were foreigners, including 210 Chinese; in 1874, about 13,000. It is built in a deep and precipitous cañon of the Washoe range of the Sierra Nevada mountains, about 6,200 ft. above the sea, and presents a very uninviting though unique appearance. It is connected by daily lines of stages with Reno on the Central Pacific railroad, 20 m. N. W., and with Carson City, 12 m. S. W. It is situated on the line of the great Comstock lode or ledge, the most productive vein of silver and gold ever known. Some of the principal mines on the lode are within the limits of the town, including the Alpha, Imperial, Gold Hill (several small ones), Yellow Jacket, Kentuck, Crown Point, Belcher, and Overman. The Belcher mine during the 22 months previous to November, 1873, returned in dividends to the stockholders \$8,232,800, and the Crown Point mine about the same amount. There are many quartz mills and hoisting works, some of the mines being 2,000 ft. deep and requiring heavy machinery. The Virginia and Truckee railroad, connecting with Virginia, Carson City, and Reno, is used to carry ore to the crushing mills, and to supply the mines with wood, &c. The water which supplies the town is brought from the summit of the Sierra Nevada, 25 m. distant, in an iron pipe 12 inches in diameter, across the Washoe valley, 1,750 ft. below the discharging point in the pipe, and thence to Virginia and Gold Hill in a flume. There is a fine hall occupied by the miners' union, and another belonging to the odd fellows and freemasons. The town has a weekly newspaper, three public schools with an average attendance of 400 pupils, and three churches, Episcopal, Methodist, and Roman Catholic. Gold Hill was founded in 1859.

GOLDONI, Carlo, an Italian dramatist, born in Venice in 1707, died in Paris in 1793. He passed his childhood in the midst of festivals and theatrical performances, with which his grandfather amused his leisure at a country

sent near Venice. At the age of 8 years he wrote a sort of comic drama, and at 13 played female parts on the stage at Perugia. He studied philosophy under the Dominicans at Rimini, but deserted them to join a troop of comedians. His father, a physician, undertook to teach him his own profession, but he soon solicited an exchange from medicine to law. At 16 he was transferred from legal studies at Venice to a scholarship in the papal college at Pavia, with the design of fitting him for the church. Within a year he became accomplished in music, dancing, and fencing, and learned a little of civil and canonical law. At the close of the second year he descended the Ticino and the Po with a company of wits and men of pleasure, and arriving at Chioggia was called upon to preach. His attempt met with brilliant success, and he returned to Pavia with a reputation for eloquence. In the third year of his scholarship he composed a satire against the inhabitants of the town for an insult that they had offered to the students, and was expelled from the college. He resumed his studies of law, and in 1732 was admitted into the corps of advocates at Venice. He had already composed two comedies, and been manager of the theatre where they were produced, playing the principal parts himself; and while waiting for clients he published a medley of prose and verse under the title of *Esperienza del passato, l'astrologo dell' avvenire*, &c. He soon after went to Milan, where his comic opera the "Venetian Gondolier" was produced and applauded. In 1734 his tragedy of *Belisario* was played at Venice with overwhelming success. His second tragedy, *Rosamonda*, failed in the following year. After furnishing other pieces with various success to different strolling companies, he married in 1736, and began to write for the company of Sacchi at Venice with the design of gradually reforming the Italian theatre. His aims were to substitute human vices and follies for fantastic and frivolous adventures, to have the plays written in full instead of being only sketched by the author and in large part improvised by the actors, and to banish from the stage the traditional masks and costumes by which the Harlequin, Birghella, Pantalón, and other chief actors were distinguished. In 1739 he was appointed Genoese consul at Venice, but after two years he again resumed his wandering life. At Rimini he was appointed director of the spectacles and amusements; he passed four months in Florence, visited Siena, and was received with enthusiasm at Pisa, where he resumed for a short time the practice of law, at the same time sending to Venice some of his most successful comedies. In 1747 he returned to Venice, determined to devote himself to the stage; and at the close of the first season he had raised the theatre to which he was attached to a superiority over its rivals, and during the second year produced 16 new pieces of three acts each. The excessive labor injured his health, and to

indemnify himself he began to publish his comedies, contesting the right to do so with the manager. He had already written 120 pieces, when in 1761 he was invited to Paris, where after writing two years for the Italian theatre he was attached to the court as instructor of the daughters of the king in the Italian language, and after three years more was awarded a pension. He continued to produce comedies at intervals, the most successful of which was the *Bourru bienfaisant*. His last literary labor was writing his memoirs, which appeared first in French (Paris, 1787), and afterward in Italian (Venice, 1788); they are said by Gibbon to be more comical than his best comedies. The most striking characteristic of Goldoni as an author is his fertility, scarcely surpassed by that of Calderon and Lope de Vega. The best of his pieces are in the Venetian dialect, and his greatest merits are his theatrical skill, and the liveliness, piquancy, and humor with which he depicts the manners of all classes of society in Italy. Schlegel criticises him as deficient in depth of characterization and in novelty and richness of invention. Critical biographies of him have been written by Giovanni (Milan, 1821), Carrer (Venice, 1824), Gavi (Milan, 1826), and Meneghezzi (Milan, 1827). Among the editions of Goldoni's works may be mentioned that of Venice in 44 vols. 8vo, 1788-'95, and that of Lucca in 26 vols., 1809.

GOLDSBOROUGH, Louis Malesherbes, an American naval officer, born in Washington in 1805. He was appointed midshipman in 1812, and made lieutenant in 1825. During the Seminole war he commanded a company of mounted volunteers, and also an armed steamer. He was made commander in 1841; took part in the Mexican war, and was afterward senior naval officer of a joint army and navy commission on the Pacific coast. He became captain in 1855, and from 1853 to 1857 was superintendent of the naval academy at Annapolis. In 1861 he was placed in command of the naval part of Burnside's expedition to North Carolina. He was made rear admiral in 1862, commanded the European squadron in 1865-'7, and subsequently the Washington navy yard.

GOLDSCHMIDT, Hermann, a German painter and astronomer, of Jewish descent, born in Frankfort, June 17, 1802, died at Fontainebleau, Sept. 11, 1866. He studied painting at Munich under Schnorr and Cornelius, and in 1836 established himself in Paris. Among his paintings are the "Cumæan Sibyl" (1844), an "Offering to Venus" (1845), "Cleopatra" and a "View of Rome" (1849), and the "Death of Romeo and Juliet" (1857). He began to devote himself to astronomy in 1847, and discovered 14 asteroids between 1852 and 1861. He also pointed out more than 10,000 stars that were wanting in the maps of the academy at Berlin, and in 1863 announced that he had observed six satellites or companion stars to Sirius, one of which had been discovered in the previous year by Alvan Clark of

Cambridge, Mass. He made his discoveries with an ordinary spyglass from his studio in an attic. The academy of sciences bestowed on him its grand astronomical prize.

GOLDSMITH, Oliver, an English author, born in the hamlet of Pallas or Pallasmore, county Longford, Ireland, Nov. 10, 1728, died in London, April 4, 1774. His father was a clergyman of the established church, and at the birth of his son was very poor. Oliver's childhood gave no special indications of his future greatness. An attack of smallpox from which he suffered while a child left its marks upon his naturally plain face, which, with a generally uninviting exterior, made his personal appearance especially unprepossessing. His elder brother Henry was a student at the university, and several relatives contributed to send Oliver there; and in 1744 he entered Trinity college, Dublin, as a sizar or poor scholar. At that time the position of that class of students was highly disagreeable. Their dress was peculiar and designed to indicate their poverty, and they were required to perform many of the menial services of the institution. It was with the utmost reluctance that Goldsmith submitted to these humbling conditions, and while subject to them he was "moody and desponding." He was often reduced to great straits, but by borrowing, pawning his books, and writing ballads he contrived to keep his place. In 1749 he was admitted to the degree of bachelor of arts, and took his final leave of the university. He now returned home, and after some months had been spent in aimless loiterings was persuaded to prepare for the church. The two years of his probation were spent at Lissoy and Ballymahon, among the idlers at the village inns or in desultory reading. In due time he presented himself, arrayed in a fashionable dress, part of which consisted of a pair of scarlet breeches, to the bishop of Elphin for ordination, and was rejected. He now obtained employment as tutor in a gentleman's family, where he remained a few months, when he quarrelled with the family, and so found himself once more a free man with more money than he had ever before possessed. He bought a horse, and, with £30 in his pocket, sallied out upon the world. A few weeks after he returned home as destitute as he had been six months before. A large part of his money had been paid for a passage to America, but when the ship sailed he was enjoying himself with some friends in the country. It was next determined that he should try the legal profession, and an uncle affording him the means, he set out for London with £50, which he lost in gaming in Dublin; and after remaining sequestered for some time, he again returned to his friends. He was next, toward the end of 1752, sent to Edinburgh to study medicine. Two winters were devoted to hearing lectures; but near the end of his second term, burdened with debts and hunted by bailiffs, he escaped from Edinburgh and fled to the continent. He passed

nearly a year at Leyden, ostensibly hearing lectures, but really devoting most of his time to pleasure, and then, after selling his books and borrowing money from his friends, he set out for Paris, where he attended chemical lectures. After remaining there but a little while, he set out to make the tour of the continent. Taking parts of Germany and Switzerland in his way, he passed to Marseilles, and thence into Italy. How he supported himself in these wanderings is told by himself, though his accounts of this part of his life must be received with caution. He says in the story of the "Philosophical Vagabond" in the "Vicar of Wakefield": "I had some knowledge of music, with a tolerable voice, and now turned what was my amusement into a present means of subsistence. . . . Whenever I approached a peasant's house toward nightfall, I played one of my most merry tunes, and that procured me not only a lodging, but subsistence for the next day." In Italy his musical powers no longer availed him, for, he said, every peasant was a better musician than himself; but he had acquired a habit of living by expedients, and here a new one presented itself. "In all the foreign universities and convents," he continues, "there are upon certain days philosophical theses maintained against any adventitious disputant, for which, if the champion maintain with any degree of dexterity, he can claim a gratuity in money, a dinner, and a bed for the night. In this manner, therefore, I fought my way toward England, walked along from city to city, examined mankind more nearly, and, if I may so express it, saw both sides of the picture." At Padua, where he remained some months, he took his medical degree. After two years had been spent in vagrant rambles, early in 1756 he landed at Dover, friendless and penniless. How he made his way thence to the metropolis is uncertain; it is only known that "in the middle of February he was wandering without friend or acquaintance, without the knowledge or comfort of one kind face, in the lonely, terrible London streets." For two or three years after his coming to London his history is very obscure. He was for some time an assistant to a chemist, and at another he practised medicine in Southwark, acting at the same time as reader and corrector of the press for the novelist and publisher Samuel Richardson. He was also for a while an usher in a school at Peckham, a business which he seems to have especially hated. It was while thus engaged that he accidentally met with the publisher of the "Monthly Review," by whom his services were engaged in the preparation of that publication. * His daily employment was to write for the review under the direction of his employer. The pages of the magazine very soon gave evidence of the acquisition that had been made to its contributors, and even the writer himself began to hope that his better days were at hand. But his path was still a rough one. A daily drudgery was required of him, alike irksome to his indo-

lence and galling to his pride. These unhappy relations of the parties could not continue long, and accordingly, at the end of five months, the engagement was discontinued by mutual consent. But this transaction was one of great importance to Goldsmith; for it brought him into his appropriate sphere, and discovered to himself and others the secret of his power. He accordingly continued to write for a variety of periodicals, but only for immediate results. At this time he was appointed physician and surgeon to one of the East India company's factories on the coast of Coromandel, but for some unexplained reason the post was afterward given to another. He then applied to the college of surgeons for the post of hospital mate, but, failing to pass the necessary examination, was rejected. In 1759 he issued his first acknowledged work, a duodecimo volume entitled "An Inquiry into the Present State of Polite Learning in Europe." This brought him into public notice, and gained him acquaintance with some of the principal men of letters of the day. In the same year he engaged in a weekly periodical called "The Bee," which met with little encouragement, and lived only eight weeks. Soon after this he agreed with the publisher of the daily "Public Ledger" to contribute some articles to that newspaper, and the famous "Chinese Letters," republished a few months after under the title of "The Citizen of the World," were the result. These consist of a series of essays on society and manners, written in the assumed character of a Chinese philosopher resident in London, in a style of great purity, and in a vein of good-natured satire. The book greatly improved both the reputation and the finances of the writer. He emerged from his garret, and took more eligible rooms in Fleet street, where he made acquaintances, among them Percy, Smollett, and Johnson, with whom he contracted a warm and lasting friendship. Burke, who had been at college with him, and Hogarth were also frequent visitors here; and here began an intimacy with Sir Joshua Reynolds which only ended with Goldsmith's life. He was admitted to membership in the famous Literary club at its institution, and lived to see many persons of distinction vainly suing for the same privilege. Goldsmith now continued his labors for the booksellers as a means of temporary subsistence. The principal work which he produced during this time was the "History of England, in a Series of Letters from a Nobleman to his Son," which, though a mere compilation, was written with a fluency and grace which won for it the praise of being "the most finished and elegant summary of English history in the same compass that had been or was likely to be written." The impressions received during his tour on the continent he now gave to the world in the form of a poem. "The Traveller" was published near the end of 1764, and worked its way slowly into popularity. "The Vicar of Wakefield"

was written simultaneously with "The Traveller," though not published till 1766. The manuscript had been sold 18 months before for £60, to save its author from the bailiffs. He next commenced writing for the stage, and in 1767 produced "The Good-Natured Man," which was acted at Covent Garden theatre the next winter. Though its success was only partial, it added to its author's reputation, and brought him the substantial reward of £500. The winter of 1768-'9 was spent in compiling a Roman history, which was published the next May, in 2 vols. 8vo. The next year he commenced the compilation of the "History of the Earth and Animated Nature," which was issued in 1774 in 8 vols. 8vo. In 1770 he published "The Deserted Village." The popularity of "The Traveller" had prepared the way for this poem, and its sale was immense. In 1771 he brought out another work on the "History of England," which in many parts was merely a reproduction of the former. Goldsmith's condition and circumstances had greatly improved with the growth of his literary reputation; but his style of living advanced even more rapidly than his resources, and his pecuniary embarrassments were daily growing upon him. The productions of his pen were in great demand, and commanded unusually large prices, but were insufficient to meet his increased expenses. Besides his large compilations and his anonymous contributions to periodicals, he was steadily occupied with the preparation of small volumes, and in original poetical composition. His second comedy, "She Stoops to Conquer," was written early in 1772, but not acted till a year later. It was coldly received by Colman, the manager of Covent Garden, but strongly sustained by Goldsmith's literary and convivial associates, and had a great success. A rich reward of fame greeted the author; and, what was more needed, its pecuniary results were highly satisfactory, though still far short of meeting his pressing necessities. In this state of his affairs, associated with the learned, the gay, and the opulent, on terms altogether honorable, he found his want of money increasing at a rate which rendered all hope of relief from his labors entirely desperate. Near the last of March, 1774, he returned from a brief visit to the country, and found himself slightly indisposed by a local disorder, which was followed by a low fever, under which the overtaxed powers of his system rapidly gave way. He was in the 46th year of his age when he died. He was interred in the burial ground of the Temple church, but no memorial was set up to indicate the place of his burial, and it is now found impossible to identify it. His friends erected a monument to his memory in Westminster abbey, for which a Latin inscription was written by Dr. Johnson; and in 1837 a marble slab with an English inscription was placed by the members of the Inner Temple in the Temple church.—Of his works not already mentioned we may cite

the "Memoirs of a Protestant condemned to the Gallies of France for his Religion," a translation from the French, and his first known publication (2 vols. 12mo, London, 1758); "Life of Voltaire," written in 1759 to accompany Purdon's translation of the *Henriade*, but published separately in a magazine; "Life of Richard Nash, Esq., of Bath" (Beau Nash), (1762); "Edwin and Angelina" (or "The Hermit"), a poem (1765); "A short English Grammar" (1766); "Beauties of English Poetry" (2 vols. 12mo, 1767); "Poems for Young Ladies" (1767); "Life of Lord Bolingbroke," originally prefixed to a dissertation on the state of parties, and reprinted separately in 1770; "Life of Thomas Parnell," prefixed to an edition of his poems (1770); "The Haunch of Venison, a Poem" (1771); "The Grecian History" (2 vols. 8vo, 1774); "Retaliation, a Poem" (4to, 1774); a translation of Scarron's *Roman comique* (1774); and "A Survey of Experimental Philosophy" (2 vols. 8vo, 1776). His essays were collected and reprinted during his lifetime. The first collection of his poems appeared in London in 1780 (2 vols. 12mo), and editions have since been issued by Newell, with remarks on the actual scene of "The Deserted Village" (4to, 1811); Mitford, in the "Aldine Poets" (12mo, 1831); Bolton Corney (8vo, 1845); E. F. Blanchard, with illustrations by Birket Foster and others (8vo, 1858), &c. His miscellaneous works have been edited by S. Rose, with a memoir by Bishop Percy (4 vols. 8vo, 1801); with a memoir by Washington Irving (4 vols., Paris, 1825); by James Prior, with an elaborate biography (6 vols. 8vo, London, 1837); with a life and notes (4 vols. 12mo, 1845); and by Peter Cunningham (4 vols. 8vo, 1855). The last two editions are the most complete and accurate that have appeared. There are numerous reprints and translations of Goldsmith's works in France and Germany, and "The Vicar of Wakefield" is there as largely used for teaching English as Caesar's "Commentaries" for Latin. Biographies of the poet have been written by Mitford, Prior, and Irving; but best of all by John Forster, "Life and Adventures of Oliver Goldsmith" (1848), enlarged as "Life and Times of Oliver Goldsmith" (2 vols., 1854), and abridged (1855). Sketches of his life were published by Sir Walter Scott in his "Lives of the Novelists," and Macaulay in the "Encyclopædia Britannica."

GOLDSTÜCKER, Theodor, a German orientalist, born in Königsberg about 1822, died in London, March 11, 1872. He studied in Bonn under Wilhelm von Schlegel and Christian Lassen, and in Paris under Burnouf, after which he became private tutor at the university of Berlin, and a friend of Humboldt, who often refers to him in the "Cosmos." In 1849 he removed to London, at the suggestion of Prof. Wilson, whom he assisted in the preparation of a Sanskrit-English dictionary. He became professor of Sanskrit in University college, London, president of the philological society, and member

of the Asiatic society; and in 1866 founded the Sanskrit society. He wrote for periodicals and cyclopædias, and among his works are a German translation of a Hindoo drama (1842) and a number of English translations of Hindoo poems, some of them with the original texts. He left unfinished a Sanskrit-English dictionary and grammar, and an edition of the *Mimamsa*.

GOLDTHREAD. See CORTIS.

GOLF (Dutch, *kolf*, a club), a Scottish game played with ball and club. The players number one or more on each side, and each is provided with a separate ball. The most skilful player is he who can land his ball in a given series of holes with the fewest strokes of his club. To place the ball in a proper position for striking off is called "teeing," and the plot on which the game is played is termed the "putting ground." The balls now used are generally made of gutta percha. The game is of very ancient date in Scotland, since there exist statutes as early as 1457 prohibiting it, lest it should interfere with archery.

GOLGOTHA. See CALVARY.

GOLIAD, a S. W. county of Texas, intersected by the San Antonio river; area, 900 sq. m.; pop. in 1870, 3,628, of whom 876 were colored. The surface is generally level, and the soil deep and rich. The bottom lands are particularly fertile. Stock raising is one of the chief occupations. The San Antonio and Mexican Gulf railroad passes through the N. E. part. Arama college, a Presbyterian institution, is at the county seat. The chief productions in 1870 were 37,640 bushels of Indian corn, and 92 bales of cotton. There were 794 horses, 917 milch cows, 5,657 other cattle, 4,853 sheep, and 1,698 swine. Capital, Goliad.

GOLIUS, Jacobus, a Dutch orientalist, born at the Hague in 1596, died in Leyden, Sept. 28, 1667. He was educated at Leyden, and appointed professor of Greek at La Rochelle when 21 years old, but soon returned to Leyden. In 1622 he joined a Dutch embassy to the emperor of Morocco, in order to perfect himself in Arabic. In 1624 he succeeded Erpenius as professor of Arabic at the university of Leyden, from 1625 to 1629 travelled through the Levant, and after his return was professor of mathematics. He was a voluminous writer on oriental philology; his greatest work is his *Lexicon Arabico-Latinum* (fol., Leyden, 1653).

GOLLNOW, a town of Prussia, in the province of Pomerania, on the Ihna, 14 m. N. E. of Stettin; pop. in 1871, 7,273. It has two churches, copper works, and manufactories of ribbon and paper. It was formerly a Hanse town.

GOLOVNIN, Vasilii, a Russian navigator, born in the government of Riazan in 1776, died in St. Petersburg in 1832. He entered the imperial navy at an early age, and soon became noted for skill and courage. In 1807 he was commissioned by Alexander I. to make a survey of the Pacific coast of the empire. He sailed from Cronstadt in command of the sloop of war Diana, and was occupied till 1811 in

examining the coasts of Kamtschatka and Russian America. In May, 1811, he sailed from Petropavlovsk in Kamtschatka to make a survey of the southern Kurile islands and the coast of Tartary. In 1803 a Russian ambassador named Resanoff had endeavored to open an intercourse with Japan, but had been repulsed, as he thought, with insult. In retaliation the ship of war which conveyed him to and from Japan plundered and burned a number of Japanese villages on the Kurile islands. These outrages excited the indignation of the Japanese, and when Golovnin with his vessel appeared in their waters, he was fired at and peremptorily ordered away. Being in want of water and provisions, he persisted in landing, and finally went on shore, July 11, with two officers, four seamen, and a Kurile interpreter, on the island of Kunashir. The Japanese received him apparently in a friendly manner, but having enticed him and his companions into a castle garrisoned by 300 or 400 soldiers, they seized the Russians and hurried them over to the large island of Yesso. They were removed thence to Hakodadi, and in September to Matsnai, the capital of Yesso, where they were kept in cages in a prison erected for them, and subjected to a continual cross-examination which was very annoying. After several months they escaped, wandered for a number of days in the forests, and were recaptured. Finally, after an imprisonment of 26 months and 26 days, Golovnin and the other Russians were given up in November, 1813. Golovnin reached St. Petersburg July 14, 1814, after an absence of seven years, was promoted, and received a pension. He was afterward sent on an exploring expedition around the world in command of the sloop of war Kamtschatka, from which he returned in 1819, and of which he published a narrative (2 vols. 4to, St. Petersburg, 1822). He wrote in Russian "Observations upon the Empire of Japan" (2 vols. 8vo, 1816), and an account of his adventures among the Japanese, both of which works have been translated into English under the title of "Memoirs of a Captivity in Japan during the years 1811, '12, and '13, with Observations on the Country and the People" (2d ed., 3 vols. 8vo, London, 1824). At the time of his death he was vice admiral and general superintendent of the Russian navy. Golovnin was an accurate observer, and his narrative is one of the most interesting of the works upon Japan. He wrote also a book containing narratives of shipwrecks and disasters at sea, which appeared in a complete edition of his works published by his son (5 vols., 1864).

GOLTZ, Bogumil, a German author, born in Warsaw, March 20, 1801, died in Thorn, Nov. 11, 1870. He was of German parentage, studied at the gymnasium of Königsberg and at the university of Breslau, and engaged in scientific agriculture. This proving unsuccessful, he devoted himself from 1830 to literary pursuits, settling at Thorn in 1847. His works include

Der Mensch und die Leute (Berlin, 1858); *Die Deutschen* (3 vols., 1860); *Feigenblätter* (3 vols., 1861-'2); *Zur Charakteristik und Naturgeschichte der Frauen* (2d ed., 1863); *Typen der Gesellschaft* (3d ed., 1864); *Die Bildung und die Gebildeten* (2 vols., 1864); *Vorlesungen* (2 vols., 1869); and *Die Weltklugheit und Lebensweisheit mit ihren correspondirenden Studien* (2 vols., 1869).

GOMBO. See GUMBO.

GOMER, the first named and probably the eldest of the seven sons of Japheth (Gen. x. 2, 3). In Ezek. xxxviii. 6, Gomer designates a people who are named in connection with Gog and Magog, apparently belonging to the Scythian family. This people is identified with the ancient Cimmerii, and by some also with the Cimbr and the more modern Celts. The latter view finds an early support in Josephus, who renders Gomer by Galatai, that is, Gauls or Celts. (See CIMBRI, and CIMMERII.)

GOMEZ, Estevan, a Portuguese explorer, born in the latter part of the 15th century, died in Toledo on October, 1525. He accompanied Magellan on his celebrated voyage in 1519, as pilot of the ship San Antonio. When the fleet entered the strait which now bears Magellan's name, the San Antonio was sent to explore a channel further south. Gomez, who was dissatisfied with his position, induced the crew to mutiny, and putting the captain in irons returned with the ship to Spain, where he arrived in March, 1521. After a short detention for this act, he was set at liberty, and in 1524 sailed from Corunna to search for a northwest passage to the Moluccas. He struck the American coast at New York bay, made out the direction of the Hudson river, and ran north as far as the Penobscot. Contrary to the royal orders, he carried off some of the natives as slaves, probably from the Kennebec, and returned to Spain, where *esclavos* (slaves) being mistaken for *clavos* (cloves), it was reported to the king that Gomez had actually reached the Spice islands.

GÖMÖR, a N. county of Hungary, bordering on the counties of Liptó, Zips, Torna, Borsod, Heves, Nógrád, and Zólyom; area, 547 sq. m.; pop. in 1869, 103,639, chiefly Magyars and Slovaks, the majority of whom are Protestants. The surface is mostly mountainous, branches of the Carpathians extending into the county. It is traversed in all directions by navigable rivers, the most important of which are the Gran, the Rima, and the Sajó. The chief occupations are mining and cattle breeding. Capital, Rima-Szombath; largest town, Rosenau.

GOMORRAH, one of the five cities of the plain or valley of Siddim, destroyed on account of the wickedness of its inhabitants. (See DEAD SEA.)

GONAIVES, a seaport town of Hayti, on the W. shore of a bay of the same name, 67 m. N. by W. of Port-au-Prince; pop. about 4,000. The streets are wide, but irregular; the houses badly constructed, and destitute of shade; and the church and military and naval hospitals are

the only public buildings of note. The harbor is commodious, and the view on the bay delightful. There are mineral springs near, and excellent public baths in the town. Coffee is the chief export; cotton and indigo are raised, but not largely exported, as formerly. Haytian independence was declared here in 1803.

GONDAR, a town of Abyssinia, the seat of the *abuna* or archbishop of the Abyssinian church, and formerly the residence of the *negus* or king, about 25 m. N. of Lake Tzana or Dembea; lat. $12^{\circ} 35' N.$, lon. $37^{\circ} 50' E.$; pop. about 7,000. It is built on a hill 1,000 ft. above the lake, which is itself upward of 6,000 ft. above the sea. The town consists of a number of scattered groups of houses, occupying an area of about 11 m. in circumference. The *Debra birhan*, "hill of light," is the principal quarter, situated S. W. of the ruins of a palace of the former Abyssinian kings, built in the 16th century by the Portuguese. On the east of the town flows the Magetzeh, on the west the Gaha, which after uniting in one stream empty into Lake Tzana. The houses, of which but few are two stories high, are built of rough blocks of volcanic stone. There are 44 churches and 1,200 clergy. The churches are round, and have conical thatched roofs projecting beyond the walls, with rows of wooden pillars for support, forming a circular alley in which the women remain while the men worship within. The Jews and Mohammedans have their own temples, and are allowed considerable religious liberty. There are manufactures of cotton goods, ornaments, jewelry, parchment, saddles, parasols, and braided ware. The currency consists partly of European gold and silver coin, and partly of lumps of rock salt. Gondar was during the middle ages, and as late as the 18th century, the capital of the Abyssinian kingdom, and contained more than 50,000 inhabitants. It became afterward the capital of the independent state of Amhara, which Theodore subdued in 1853, making Gondar once more the capital of Abyssinia, which it continued to be till his death in 1868.

GONDOKORO, a town in the territory of the Bari negroes, on the White Nile, which is here called Yubiri or Kidi, lat. $4^{\circ} 54' N.$, lon. $31^{\circ} 46' E.$ It is a station of the ivory traders, who occupy it for two months each year, after which it is deserted. It has only a few miserable huts; the country around it is a desert, and the climate unhealthy. A Catholic mission was established there in 1853 by Knoblecher, but was discontinued in 1858. In 1873 Sir Samuel Baker visited it, broke up the slave trade, and proclaimed its incorporation with the dominions of the khedive of Egypt.

GONDOLA, a light and swift kind of boat, used on the canals of Venice and supplying the place of carriages. They are usually 25 or 30 ft. long, 5 ft. wide in the middle, and sharp at both ends, which are curved upward, the bow being ornamented with a high serrated iron plate something like the letter S in form.

Near the middle is a small cabin for the use of passengers. Formerly immense sums were sometimes expended by the great nobles on the decoration of these cabins; and this extravagance was carried so far that it was found necessary to pass a law compelling uniformity in style, no distinction of ornament or color being permitted except in the gondolas of foreign ambassadors and in that of the patriarch, who, if



Gondola.

a cardinal, was allowed to use red silk or wool in the decoration of his cabin. Since that time all have been painted black and their cabins hung with black cloth. They are propelled sometimes by a single gondolier, standing at the stern, and sometimes by two, one at the stern and one at the bow. At the beginning of this century there are said to have been more than 6,000 gondolas in Venice, and the gondoliers formed an important body, noted for their wit and humor as well as for their skill with the oars. They were celebrated also for their singing and their recitations of passages from Tasso and Ariosto, but their songs are now seldom heard.

GONDS, an aboriginal tribe inhabiting the highlands of the Central Provinces of India, whence that region derives the name of Gondwana or Gundwana. The earliest authentic records represent them as already affected by intermarriage and association with the Hindoos, and within the historic period their original characteristics have been still further modified by the same influences. The true Gonds, however, appear to be allied to the Dravidian races of southern India. They are a comparatively rude people, sturdy, restless, hardy, and fearless. The skin of the Gond is brown, and his hair is straight and black. He seldom exceeds 5 ft. 2 in. in height. The entire number of Gonds now dwelling in the hill tracts of central India is estimated at over 800,000. Their condition varies greatly in different localities. Near the Hindoo boundaries large numbers of them are engaged as agricultural laborers; the inhabitants of the interior are more secluded, wild, and independent. The Raj Gonds, in the eastern part of Gondwana, have sprung from the intermixture of the aborigines and Rajpoots. The Gonds possess no written language; they are generally somewhat familiar with Hindostanee, but

usually converse among themselves in their own tongue. Their religion is a degraded sort of pantheism. While polygamy is not prohibited, it is practically of rare occurrence, as a wife cannot be obtained without a payment, either in money or services, to her family. The women engage in every sort of labor except that of the chase, in which the men are extremely expert. The chief hunters of the villages now use matchlocks in place of the bow and arrow, and the men very generally carry little axes, which they throw with such skill and precision as to kill birds and animals at a considerable distance. These axes are in fact the principal agricultural implement of the Gonds, as their simple system of cultivation consists merely in felling timber, burning it, and planting grain in the ashes. The advance of the Gonds in civilization appears to be proportional to the admixture of the Hindoo element with the aboriginal race. Where this is small, as in the interior of the highlands, the scanty means of the people for subsistence, and the constant exposure to malaria and disease, operate most powerfully against any increase of prosperity. Their general condition as a people, however, seems to be gradually improving under British rule.

GONGORA Y ARGOTE, Luis de, a Spanish poet, born in Cordova, Jan. 11, 1561, died there, May 23, 1627. He was the son of a distinguished lawyer, and was educated at Salamanca for his father's profession, but abandoned it for poetry. He lived in his native city poor and obscure till the age of 43, when, having entered holy orders, he was made titular chaplain to Philip III.; but after 11 years of neglect he returned to Cordova in broken health. His early poetry, consisting of ballads and odes, is remarkable for vigor and simplicity, but later in life he adopted an affected, obscure, and highly metaphorical style, which for a time became fashionable in Spain, and even in France, and was imitated by a large school of succeeding poets. It is known as the *estilo culto*, or cultivated style, and one of its most marked features was the use of obsolete and foreign words and of new and forced constructions. So unintelligible were the poems of Gongora that even in his own lifetime commentaries were written to explain them. His works were published in 1636-'46, with a commentary 1,500 pages long by Colonel, a poet of the same school (3 vols. 4to, Madrid).

GONIATITES, a group of fossil cephalopods, having a nautilus-like shell, but with the siphuncle dorsal as in the ammonites; the septa, or partitions between the chambers, have one or more flexures at the margin. These flexures become more and more complex, from the species of the Hamilton (middle Devonian) period, when they first appear, to those of the carboniferous period, when they disappear, being replaced in mesozoic time by the ceratites and ammonites, to which they are nearly related. The *G. Marcellensis* (Van.), from the

Marcellus shales of New York, has been found a foot in diameter. *Clymenia*, an allied genus,



Goniatites (*G. retorsus*).

had the siphuncle ventral, and the septa without a distinct dorsal lobe on the median line.

GONIOMETER (Gr. γωνία, an angle, and μέτρον, a measure), an instrument for measuring the angles of crystals. Two kinds of goniometers are in use, one designed to measure the angles by direct application of the instrument to the faces of the crystal, and the other by the arc through which the crystal must be turned for two adjoining faces to reflect in succession the same object to the eye. The first and simplest form is the common or Haüy's goniometer. It is a graduated semicircular arc with a fixed and a movable radius, between which the crystal is placed, each radius being made to coincide with the plane of one of its faces. The angle of their opening may then be read off on the arc. This instrument cannot be depended upon for nicety of measurement. The reflecting goniometer was invented by Dr. Wollaston, and several modified forms of it have been introduced by others. It requires for its use crystals with clear faces, that can distinctly reflect the image of a dark line across a clear light, as the bar of a window sash. The instrument is made with great precision, and its graduated arc is furnished with a vernier, by which the degrees are divided into minutes. The French goniometer of Adelman combines the principles of both the common and reflecting instruments, and is much less expensive than Wollaston's.

GONSALVO DE CORDOVA, or **Gonzalo Hernandez de Cordova**, called *el Gran Capitán* (the Great Captain), a Spanish general, born at Montilla, near Cordova, March 16, 1453, died in Granada, Dec. 2, 1515. His family name was Aguilar, but his ancestors rendered such services at the conquest of Cordova that St. Ferdinand permitted them to assume the name of that city. At the court of Ferdinand and Isabella Gonsalvo attracted attention by his beauty and knightly skill and the magnificence of his living. He distinguished himself at Albuera during the war with Portugal (1479), but gained the greatest renown in the war with the Moors, which began in 1481 and ended at the beginning of 1492. In conjunction with the king's

secretary, he conducted the secret negotiation with the Moorish monarch, Abdallah or Boabdil, which resulted in the capitulation of Granada. In 1495 he was sent with a small squadron against the French who had invaded the kingdom of Naples. He landed at Messina, and thence crossed over to the mainland. In his first battle at Seminara, fought against his advice, he was defeated, but his desperate valor saved the army from destruction and King Ferdinand from capture. His subsequent operations were so successful that by the end of 1496 the French, who a year before had possessed the whole kingdom, yielded up their last fortress, and withdrew to their own country. At the request of the pope, he then laid siege to Ostia, which was held by a formidable band of freebooters, and carried it by storm. On his return to Naples the king gave him the title of duke of St. Angelo, with an estate containing 3,000 vassals. In the beginning of 1500 he was called into the field to suppress a sudden insurrection of the Moors of the Alpujarras. In May of the same year he sailed from Malaga in command of an army of 4,600 men, designed to protect Naples, which the French were preparing to invade a second time. In September, in conjunction with a Venetian fleet, he laid siege to the almost impregnable fortress of St. George in Cephalonia, and the place was carried by assault in January, 1501. Gonsalvo sailed thence to Sicily, where he was waited on by an embassy from the Venetian senate bringing him magnificent presents. Meanwhile, by a secret treaty, Louis XII. of France and Ferdinand of Spain had agreed to divide Naples between them. Gonsalvo was appointed lieutenant general of the Spanish portion, which he overran and conquered in less than a month, except Taranto, which capitulated after a long siege, March 1, 1502. The French and Spaniards speedily quarrelled about their boundaries in Naples, and in July their dispute broke into open hostilities. Gonsalvo, whose force was much inferior to that of the French, threw himself into the fortified seaport of Barletta on the Adriatic. Here, from July, 1502, to April, 1503, he sustained one of the most memorable sieges in history, conducted by the duke of Nemours and the chevalier Bayard. Having at length received by sea a small reinforcement, the Great Captain on April 28 broke forth from Barletta, gave battle to the French, and defeated them, with the slaughter of half their army, the loss of all their artillery and baggage, and most of their colors. This victory decided the war, and in a few weeks all the fortresses held by the French were taken or surrendered, with the exception of Gaëta, into which the remnant of the French army had thrown themselves. A long siege ensued, which gave time to Louis XII. to despatch into Italy one of the finest armies that France had ever sent into the field. Gonsalvo met the French on the Garigliano, near Gaëta, defeated them in several encounters, and on Dec. 29,

1503, routed them totally with great slaughter. This defeat put an end to the French attempt to conquer Naples. Gaëta surrendered Jan. 1, 1504, and by a treaty, Feb. 11, peace was restored between France and Spain, the latter power retaining Naples. Gonsalvo remained in Naples, ruling the kingdom as viceroy till 1507, when Ferdinand, suspecting that he meant to make himself independent, recalled him to Spain. Soon after his arrival there he retired to his estates near Loja, where he lived in great magnificence. In 1512 the French again made head in Italy, and Ferdinand called upon Gonsalvo to take command of an army for the protection of Naples; and when it became known that he was to command, nearly all the nobles of Spain volunteered. This enthusiasm so augmented Ferdinand's distrust that he countermanded his orders, and directed Gonsalvo to disband his levies. Three years later Gonsalvo was attacked by a quartan fever, and removed to his palace in Granada, in hopes that the climate of that city would benefit his health; but he died shortly after his arrival there. His remains were laid in a sumptuous mausoleum in a chapel of the church of St. Gerónimo.

GONZAGA, a town of Italy, in the province and 15 m. S. of the city of Mantua; pop. about 15,000. It was formerly fortified, and is celebrated for its old castle, the cradle of the Gonzaga family. Silk is manufactured here.

GONZAGA, an ancient Italian family which ruled over Mantua from 1328 to 1707. Its founder was Ludovico I. (died in 1360), and his successors branched off into several lines, prominent among which were those of the dukes of Nevers and of Guastalla. Some of the rulers of Mantua were distinguished patrons of letters and art, and made their court one of the most brilliant in Italy. They intermarried with the Medici and the Estes, and a number of the ladies, especially Cecilia (born about 1424) and Lucrezia (died 1576), were renowned for learning. Besides Ludovico III. (1444-'78), surnamed the Turk for fighting the Mussulmans, there were other gallant warriors in the family, and particularly Francesco II. (1484-1519) and Vincenzo I. (1587-1611); and celebrated as a cardinal from 1561 till his death (1566) was Francesco Gonzaga. On the extinction of the elder branch after the death of Vincenzo II. (1627), a war for the succession to the dominion of Mantua and other territories resulted in favor of Charles I., duke of Nevers. His daughter Maria became queen of Poland, and another daughter, Anna, wife of the count palatine Edward. The beauty and wit of the latter made her conspicuous in Paris at the court of Anne of Austria, and her memoirs were published in 1686. Charles IV., the last duke of Mantua (died in 1708), was dispossessed in 1707 by Austria for having sided with France in the war of the Spanish succession, Savoy taking Montferrat. A collateral branch of the family still exists, the head of which

(1874) is the marquis Guerrieri-Gonzaga, the largest land owner in the district of Gonzaga. —A pretender to the dominion over Mantua appeared in 1841, in a person styling himself Alessandro di Gonzaga, Prince Castiglione. He was a soldier of fortune, born in Dresden in 1799, and is described by some authorities as a Pole of the name of Murzynowski, and by others as a son of a Russian officer of Italian origin, and again as a son or brother of a French officer named Gonzague; and he was successively engaged in the French, Russian, and Spanish armies, and in the Polish revolution of 1830-'31. In the latter part of his life he was arrested in Paris for selling decorations, and on being released after two years by Louis Napoleon, he went to London and died in 1869. He published *Odes patriotiques*, and several pamphlets and novels.

GONZAGA, Luigi (St. ALOYSIUS), a saint of the Roman Catholic church, born in the castle of Castiglione, near Brescia, March 9, 1568, died in Rome, June 21, 1591. He was educated at the courts of Florence, Mantua, and Spain, entered the society of Jesus in 1585, renouncing the marquisate of Castiglione in favor of his brother, and went in 1591 by order of the pope to settle the rival claims of the duke of Mantua and of his own brother to the lands of Solferino. Coming back to Rome, he found the city devastated by the plague, devoted himself to the sick, and was stricken down by the epidemic. He was beatified by Gregory XV. in 1621, and canonized in 1726 by Benedict XIII., who declared him the patron saint of colleges. His feast is celebrated on June 21. His life has been written in Italian by the Jesuit Cepari, and in French by Doriéans.

GONZAGA, Thomas Antonio Costa de, a Brazilian poet, called the Portuguese Anacreon, born in Porto in 1747, died in Mozambique in 1793. After studying in the university of Coimbra, Portugal, he returned in 1768 to Brazil to enter on an official career. In 1788, when he was about to be married, he became involved in a conspiracy, and was condemned to perpetual exile in an island on the coast of eastern Africa, which was commuted to ten years' banishment to Mozambique. He was attacked by fever soon after reaching Africa, from which he recovered only to fall into madness. The most interesting of his poems were composed during his captivity. They are popular alike in Brazil and Portugal, and have been often reprinted. In grace, tenderness, purity of style, and harmony of verse, he ranks among the first Portuguese poets.

GONZALES, a S. county of Texas, intersected by the Guadalupe river; area, 1,026 sq. m.; pop. in 1870, 8,951, of whom 3,670 were colored. It has an undulating surface, about one third of which is covered with ash, oak, and other timber. The soil is fertile, consisting chiefly of a black loam. There are rich deposits of coal and iron. Guadalupe college is at the county seat. The chief productions in

1870 were 203,591 bushels of Indian corn, 28,932 of sweet potatoes, and 2,174 bales of cotton. There were 8,977 horses, 8,833 milch cows, 77,567 other cattle, 5,790 sheep, and 22,153 swine. Capital, Gonzales.

GOOCHLAND, an E. county of Virginia, bounded S. by James river; area, 260 sq. m.; pop. in 1870, 10,313 of whom 6,601 were colored. The surface is undulating, and the soil, watered by numerous creeks, was formerly very fertile. Bituminous coal is found in abundance, and a little gold has been discovered. It is traversed by the James River canal. The chief productions in 1870 were 76,177 bushels of wheat, 101,402 of Indian corn, 72,630 of oats, and 405,215 lbs. of tobacco. There were 670 horses, 2,727 cattle, 3,231 swine, and 16 flour mills. Capital, Goochland.

GOOD, John Mason, an English physician and author, born at Epping, Essex, May 25, 1764, died in January, 1827. He began his medical education as apprentice to a surgeon at Gosport, afterward studied at Guy's hospital, and in 1784 commenced practice as a surgeon at Sudbury. He removed to London in 1793, and gained in time a large professional connection. In 1810 he delivered a course of lectures at the Surrey institute, which were afterward published under the title of "The Book of Nature." In 1812 he edited the "Letters of Junius," comprising not only the acknowledged productions of that writer, but also more than 100 letters and papers of doubtful authenticity. He was an accomplished linguist, and contributed largely to periodicals. His principal works are: "Maria, an Elegiac Ode" (1786); "Diseases of Prisons and Poorhouses" (1795); "History of Medicine as far as it relates to the Profession of an Apothecary" (1795); "Parish Workhouses" (1798, 1805); "Song of Songs, or Sacred Idyls, translated from the Hebrew, with Notes" (1803); "Triumph of Britain, an Ode" (1803); "Memoirs of Alexander Geddes" (1803); "The Nature of Things," a translation from Lucretius, with notes (2 vols. 4to, 1805-'7); "Essay on Medical Technology" (1810); "The Book of Job, literally translated from the Hebrew," with notes and a dissertation (1812); "Physiological System of Nosology" (1817); "Pantologia, or Encyclopædia comprising a General Dictionary of Arts, Sciences, and General Literature," in conjunction with Olinthus Gregory and Newton Bosworth, published periodically, and completed in 12 vols. in 1813; "The Study of Medicine" (4 vols., 1822); and "The Book of Nature" (3 vols., 1826). His life was written by Dr. Gregory (London, 1828).

GOODALL, I. Edward, an English engraver, born in Leeds in September, 1795, died April 11, 1870. He is known by his engravings from Turner's pictures, in which the artist's characteristics are reproduced with great fidelity. Of his smaller works, the illustrations in Rogers's "Italy" are best known. His large

line engravings of Turner's "Tivoli," "Cologne," and "Caligula's Bridge" are splendid specimens of the art. **II. Frederick**, a painter, son of the preceding, born in London, Sept. 17, 1822. At 14 years of age he received a prize from the society of arts for a drawing of Lambeth palace, and at 16 another for his first oil painting. He subsequently became a frequent exhibitor at the royal academy, of which he was elected an associate in 1852, and a member in 1863. Several of his works, such as "L'Allegro" and "The Soldier's Dream," have been engraved. His "Tired Soldier" and "Village Festival" are in the Vernon gallery.

GOOD FRIDAY, the anniversary of Christ's death. It is only in England that the term "good" is applied to this feast. Its ancient title was Holy Friday, or the Friday in Holy Week. The Saxons named it "Long Friday," both because of its long religious services and of its rigorous and protracted fast. The Germans term it sometimes *Stiller Freitag*, because bells and organs are silent on that day, and sometimes *Char-Freitag*, from an old word meaning penitence. As it commemorates the day on which Christ, the true paschal lamb, was slain, it was designated as "the pasch" in some of the ancient eastern churches; but the appellation of "pasch of the crucifixion," or "the sorrowful pasch," was soon universally applied to it by the Greeks, and it is still so called in the East and in several countries of western Europe. The early Christian writers mention it as a day of rigorous fasting and peculiar solemnity. The ritual observed both in the Greek and Latin churches has special reference to the circumstances of Christ's death and entombment. Hence in all large churches an altar in a separate chapel is decorated with all possible magnificence, and called "the sepulchre." Thither the consecrated host, or "body of the Lord," is borne in solemn procession on Holy Thursday, and continues to be visited throughout the day by crowds of worshippers. On Good Friday morning, after the chanting of the prophecies foretelling Christ's death and of the recital of his passion from the Gospel of St. John, takes place the "adoration" or kissing of the cross. A crucifix is placed on the steps before the high altar, and while the choir sings the *improperia*, or reproaches of the Messiah to the people who crucified him, the officiating clergy and their attendants approach barefooted, each one making three successive prostrations before they kiss the feet of the sacred image. It is then presented by the celebrant at the sanctuary railing to the veneration of the people. In England, before the reformation, this ceremony was called the creeping to the cross, as appears from a proclamation of Henry VIII.: "On Good Friday it shall be declared howe creepynge of ourselfe to Christe before the crosse, and the kysynge of it a memorie of our redemption made upon the crosse." After

this ceremony the consecrated host is brought in procession from "the sepulchre" to the high altar, where it is incensed, offered to the adoration of all present, and consumed by the celebrant. This is called the "mass of the presanctified" or preconsecrated bread, as the eucharistic elements are not consecrated on that day. In honor of the redemption accomplished on Good Friday, it was customary in the early church to release public penitents from their probation and the excommunicated from their ban. The first Christian emperors, not satisfied with closing the law courts during Holy and Easter weeks, honored the anniversary of salvation by liberating from prison and recalling from exile all but the worst criminals; and also, to encourage the practice then becoming general of manumitting slaves in remembrance of Christ's death, by allowing the courts and magistrates to perfect the instruments necessary for this purpose. These customs, sanctioned by a decree of Valentinian I. in 367, were embodied by Justinian in his code. The same spirit afterward pervaded the manners and legislation of western peoples. In England and Ireland Good Friday is a legal holiday as well as a fast day. The practice of breakfasting on hot cross buns on this day is still kept up in the English cities, and is also common in the United States. In the north of England it is customary to eat herb puddings in which a principal ingredient is the "passion dock," which in fructification produces fancied representations of the cross, nails, hammer, &c. The English kings were wont in ancient times to hallow rings on Good Friday, to preserve the wearers from epilepsy. The Protestant Episcopal, Lutheran, and Reformed churches, as well as many Methodists, observe the day by fasting and special services.

GOOD HOPE, Cape of. See CAPE OF GOOD HOPE.

GOODHUE, a S. E. county of Minnesota, bordering on the Mississippi, separated from Wisconsin by Lake Pepin, and watered by Cannon river; area, about 650 sq. m.; pop. in 1870, 22,618. The surface is moderately uneven, and the soil fertile. It is traversed by the river division of the Milwaukee and St. Paul railroad. The chief productions in 1870 were 1,815,603 bushels of wheat, 209,790 of Indian corn, 825,301 of oats, 81,878 of barley, 85,390 of potatoes, 470,201 lbs. of butter, and 31,468 tons of hay. There were 6,766 horses, 6,485 milch cows, 9,021 other cattle, 6,241 sheep, and 6,671 swine; 2 manufactories of agricultural implements, 5 of carriages, 4 of barrels, 3 of furniture, 8 of saddles and harness, 5 of tin, copper, and sheet-iron ware, 1 of woollen goods, 4 saw mills, 8 flour mills, and 5 breweries. Capital, Red Wing.

GOODRICH. **I. Elizur**, an American clergyman, born in Wethersfield, Conn., Oct. 26, 1784, died in Norfolk, Conn., Nov. 21, 1797. He graduated at Yale college in 1752, and was tutor there in 1755. In the busiest scenes of his subsequent ministry he rarely failed to cal-

culate the eclipses of each successive year; and when the aurora borealis of 1780 made its appearance, he gave one of the fullest and most accurate accounts of it ever published, with exact drawings of the auroral arch. In 1756 he was ordained minister of the Congregational church in Durlham, Conn., in which office he continued till his death. He was an active friend of the revolution, preaching the right of resistance, and urging his people to lay down their property and lives in the conflict. He published several sermons, and left behind him some hundreds of essays on difficult passages of Scripture. **II. Chauncey Allen**, an American scholar, grandson of the preceding, born in New Haven, Conn., Oct. 23, 1790, died there, Feb. 25, 1860. He graduated at Yale college in 1810, and was tutor there from 1812 to 1814. After a course of theological study he became pastor of a Congregational church in Middletown, Conn. In 1817 he was elected professor of rhetoric and oratory in Yale college, and continued in that office till 1839, when he was transferred to the professorship of pastoral theology. He published in 1814 a Greek grammar, translated chiefly from Hachenberg; this he subsequently revised and enlarged, and published under his own name. In 1832 he published "Latin Lessons" and "Greek Lessons," in which the precepts of grammar are throughout accompanied by practical exercises. During several years he edited the "Quarterly Christian Spectator." In 1828 Noah Webster, his father-in-law, intrusted to him the superintendence of the octavo abridgment of his large dictionary, and he published in 1847 greatly enlarged and improved editions of the 4to and 8vo dictionaries. In 1856 he published in 8vo the new university edition of Webster's dictionary, and in 1859 a new issue of the unabridged 4to dictionary. At the time of his death he was engaged in a thorough revision of the dictionary, which was published in 1864. **III. Samuel Griswold**, better known under the assumed name of Peter Parley, an American author, nephew of the preceding, born in Ridgefield, Conn., Aug. 19, 1793, died in New York, May 9, 1860. He engaged in the publishing business in Hartford, and, after visiting Europe in 1824, established himself as a publisher in Boston, and edited from 1828 to 1842 the "Token," an illustrated annual, to which he contributed several tales and poems. His popular Peter Parley series of juvenile books was begun soon after his removal to Boston, and gradually extended to more than 100 volumes, comprising geographies, histories, travels, stories, and various illustrations of the arts and sciences. The success of these works caused several spurious books to appear under his pseudonym. In 1841 he established "Merry's Museum and Parley's Magazine," a juvenile periodical, which he edited till 1854. In 1851 he was appointed United States consul at Paris, and while there published in French *Les États*

Unis, aperçu statistique, historique, géographique, industriel et social" (1852). He was also the author of "The Outcast, and other Poems" (1837; illustrated ed., 1851); "Fireside Education" (1841); "Sketches from a Student's Window;" "Recollections of a Lifetime" (1857); and "Illustrated Natural History of the Animal Kingdom" (1859). **IV. Frank Boott**, an American author, son of the preceding, born in Boston, Dec. 14, 1826. He graduated at Harvard college in 1845, and was for several years the Paris correspondent of the "New York Times," writing under the signature of "Dick Tinto." A volume made up from his letters was published in 1854, entitled "Tri-colored Sketches of Paris." He has also published "The Court of Napoleon" (1857), "Man upon the Sea" (1858), and "Women of Beauty and Heroism" (1859).

GOOD WILL, the interest or advantage supposed to be attached to a certain established business. Nothing can be more uncertain or intangible than this; and it was for some time a question whether the law would recognize it as of pecuniary value. But it is clear that it may have, under some circumstances, a very great pecuniary value. If a partnership be established in a certain place, and has there done business for a long time, in a way which has given general satisfaction and attracted a wide and to all appearance a permanent patronage or custom, whether this be by the excellence and variety of its stock of goods, its honesty and exactness, or its supposed wealth, this partnership has a pecuniary interest in this good will, in addition to the amount of its mere stock and capital. But, while as between partners this good will is generally considered to have a value, and will be recognized and provided for by courts of equity in settling any disputes between them, and in general passes by survivorship to the remaining partners when one or more die, yet the rules of law which enter into the adjustment of good will can hardly be considered as settled. In case of insolvency, it is however clear that a court having jurisdiction of the case will recognize it as valuable, and will take care that no partner behave in such a way as to diminish its value, and will make due orders for reducing it by sale or otherwise into the form of available assets. But when the good will of a business passes by the insolvency of the trader into the hands of assignees, the trader is no longer under any obligations to continue his exertions to increase or sustain its value, although he must do nothing to injure it.—The good will of a business is often bought and sold, and made the subject of arrangement in various ways; and it would undoubtedly be regarded as a sufficient consideration for a promise to pay money. It has been held that the sale of a business, with the stock and "good will," carried with it, by implication, a promise not to enter upon a similar business so near to the old stand as to interfere materially with the purchaser. This

would seem to be equitable, and ought to be provided for in any sale or transfer of the good will. We doubt, however, whether our courts would now infer such an agreement from a mere transfer of the good will, in the absence of any express stipulation on the subject.

GOODWIN SANDS, dangerous sand banks off the E. coast of Kent, England, separated from the mainland by the roadstead called the Downs, which has an average width of about $5\frac{1}{2}$ m. The banks, which are loose and shifting, are divided by a narrow channel called the Swash, navigable for small boats. The northern portion is about $3\frac{1}{2}$ m. long, and the southern about 10 m., the average width of each being $2\frac{1}{2}$ m. At low water many parts are dry and firm, but with the coming of the tide the sand becomes saturated and dangerous. Lightships are stationed at their N. and S. extremities and N. of the Swash, on which bells are kept ringing in hazy weather. Many fatal shipwrecks have taken place on these sands, which are full of danger to vessels passing into the Thames or the North sea. They are said to have once formed a part of the mainland of Kent, and to have belonged to the Saxon earl Goodwin shortly before the Norman conquest. They were submerged about A. D. 1200.

GOODYEAR, Charles, an American inventor, born in New Haven, Conn., Dec. 29, 1800, died in New York, July 1, 1860. He received only a public school education. After coming of age, he joined his father Amasa Goodyear, the pioneer in the American manufacture of hardware, in the hardware business in Philadelphia. The firm being overwhelmed by the commercial disasters of 1830, he selected as a new occupation the improvement of the manufacture of India rubber. His early experiments were carried on at New Haven, Conn., Roxbury, Lynn, Boston, and Woburn, Mass., and the city of New York. The first important improvement made by him was in New York in 1836, being a method of depriving India rubber of its adhesiveness by dipping it into a preparation of nitric acid. The nitric acid gas process, as it was called, was introduced into public use, and met with great favor, especially in the manufacture of shoes, which continued to be made by that process in great numbers at Providence, R. I., until it was superseded by the superior method of vulcanization. The beneficial effect of the nitric acid process was confined to the surface, the interior body of the gum remaining subject to all the defects of native India rubber. It did not satisfy the hopes of Goodyear, and in 1838-'9 he made at Woburn, Mass., many experiments with compounds of India rubber and sulphur. In January, 1839, he observed that a piece of India rubber, mixed with ingredients among which was sulphur, when accidentally brought in contact with a red-hot stove, was not melted, but that in certain portions it was charred, and in other portions it remained elastic though deprived of adhesiveness. The material was vul-

canized; *i. e.*, it had undergone the change produced by a high degree of artificial heat. Thus were presented the germs of the two forms of vulcanized India rubber, now commonly known as the soft and the hard compounds. From this time until his death the process of vulcanization occupied his whole attention, but he reaped no adequate pecuniary reward for his labors. The Goodyear patents, now more than 60 in number, have been very expensive in themselves, and still more so from the necessity of defending and protecting them against infringers. The first publication of the process of vulcanization was Goodyear's patent for France, dated April 16, 1844. The French laws require that the patentee shall put and keep his invention in public use in France within two years from its date. Goodyear endeavored to comply with this and with all other requirements of the French laws, and thought he had effectually done so; but the courts of France decided that he had not complied in every particular, and that therefore his patent had become void. In England he was still more unfortunate. Having sent specimens of vulcanized fabrics to Charles Mackintosh and co. in 1842, and having opened with them a negotiation for the sale of the secret of the invention or discovery, one of the partners of that firm named Thomas Hancock, availing himself of the hints and opportunities thus presented to him, rediscovered, as he affirms, the process of vulcanization, and described it in a patent for England, which was enrolled on May 21, 1844, about five weeks after the specification and publication of the discovery to the world by Goodyear's patent for vulcanization in France. The patent of Hancock, held good according to English law, thus superseded Goodyear's English patent for vulcanization, which bore date a few days later. Goodyear, however, obtained the great council medal of the exhibition of all nations at London in 1851, the grand medal of honor of the world's exhibition at Paris in 1855, and the cross of the legion of honor, presented by Napoleon III. (See *CAOUTCHOUC*.)

GOOKIN, Daniel, an American author and soldier, born in Kent, England, about 1612, died in Cambridge, Mass., March 19, 1687. He came with his father to Virginia in 1621, held with 35 men his plantation, now Newport News, against the savages during the Indian massacres of March, 1622, and removed in 1644 to Massachusetts, in consequence of his sympathy with the doctrines of the Puritans. He settled in Cambridge, and in 1656 became superintendent of all the Indians who had submitted to the government of Massachusetts, an office which he held till his death. He protected the fugitive regicides in 1661, was appointed one of the two licensers of the Cambridge printing press in the following year, became unpopular during King Philip's war by the protection which he extended to the Indians, and in 1681 was made major general of the colony. He died so poor

that John Eliot solicited from Robert Boyle a gift of £10 for his widow. His "Historical Collections of the Indians of Massachusetts" bears the date of 1674, and was first published in 1792. He is said to have written a history of New England, which is lost.

GOOLE, a town of Yorkshire, England, on the Ouse, 22 m. W. of Hull; pop. in 1871, 7,680. It is the terminus of the Pontefract and Goole railway, and the railway from Hull to Doncaster runs through it; and it has communication with Leeds, Manchester, and Liverpool by means of the Knottingley and Goole canal. There are here extensive docks and warehouses, and a slip for repairing vessels. Boat building, sail making, and iron founding are carried on to some extent. It contains a new church, with a lofty tower, places of worship for various dissenting denominations, and several literary and charitable institutions.

GOOMTEE, or **Goonty** (Hin. *Gomati*), a river of British India, rising in the district of Shah-jehanpoor, in a small lake, 19 m. E. of Pilibheet, lat. 28° 35' N., lon. 80° 10' E., and after a S. E. course of 482 m., in which it traverses the territory of Oude, falling into the Ganges, on its left side, in lat. 25° 29', lon. 83° 15'. The principal town on its banks is Lucknow, 308 m. from its mouth, to which it is navigable. It is wide, in the dry season 4 ft. deep, and it rises 15 ft. at Lucknow in the rainy season.

GOOSANDER, an American fishing duck of the subfamily *mergina* and genus *mergus* (Linn.); besides the goosander (*M. Americanus*, Cassin), the subfamily includes the mergansers and the smew. The bird is about 27 in. long, and 3 ft. in extent of wings; the bill about 3 in., of a



Goosander (*Mergus Americanus*).

bright red color; weight 5 lbs.; the female is considerably smaller. Common names of this species are sawbill, sheldrake, and, for the female, dun diver. The feathers of the forehead extend in an acute angle on the bill; the nostrils are large, and near the middle of the bill;

the plumage is full, soft, and glossy; there is a slight crest in the male; the wings and tail are short, the latter rounded, with 18 feathers; the iris is carmine; the feet orange red in winter, vermilion in the breeding season; the bill narrow, compressed, with a conspicuous black nail, the edges with sharp recurved serrations; tarsi two thirds the length of the middle toe, much compressed. The head and neck are metallic green; lower neck and rest of body beneath creamy white, becoming salmon red; fore part of back black; lower back, rump, and tail feathers ashy gray; most of the wings creamy white, except the greater coverts, which are black at the base, forming a black bar, and the tertials narrowly edged with black; primaries black; sides with slight transverse bars. In the female the head and neck are chestnut; above ashy, salmon-colored below; the black base of the secondaries is entirely concealed, and there is less white on the wings. In the European sheldrake (*M. merganser*, Linn.) the bill is relatively longer and narrower; the elongated feathers forming the crest are longer and more erectile, and begin almost at the base of the bill; and the bar of black on the wings is concealed by the lesser coverts. The American bird was considered the same as the European, until separated by Mr. Cassin in 1853. The goosander is found throughout North America, breeding in the temperate and northern regions, in the neighborhood of both salt and fresh water; it is abundant in the fur countries. It is strong and active, a powerful swimmer, excellent diver, and rapid flier; it swims very deeply, presenting a small mark for the gunner, diving at the flash or at the click of the lock; it can run very well on land. It is very voracious, feeding on fish, mollusks, and reptiles; it dives for its prey, rising to the surface with the fish or other animal in its bill, and swallows it head foremost; its flesh is tough and oily. The nest is made near the water, of weeds and roots, and is lined with its down; it is about 7½ in. in diameter internally, and 4 in. deep; the eggs, 7 or 8, are 3 in. long by two broad, smooth, elliptical, and of a uniform dull cream color; the young of a few hours old are excellent divers. The note is a harsh croak. They are easily caught, like the loon, on hooks baited with fish. In their digestive organs, the mergansers are more allied to the divers (*colymbidae*) than to the ducks (*anatidae*), and seem to form a connecting link between the two.

GOOSE, a web-footed bird, of the order *anser*es and family *anatidae*, of which the typical species are in the subfamily *anserinae*. The other subfamily consists of the *plectropterinae*, or spur-winged geese, in which the bend of the wings is armed with a spur or blunt tubercle; it contains the genera *anseranas* (Less.), of Australia; *plectropterus* (Leach), of Africa, having a naked protuberance at the base of the culmen and a part of the neck bare; *sarkidiornis* (Eyton), of the warm regions of America, India, and Africa, having a large,

rounded, laterally compressed caruncle on the top of the bill; and *chenalopez* (Steph.), of Africa and tropical America. Of the last the Egyptian or fox goose (*C. Egyptiacus*, Linn.) is a species, bright-colored, and revered by the ancient Egyptians on account of its attachment to its young; it has been domesticated in that country.—The subfamily *anserinae*, which includes the genera *cereopsis* (Lath.), *anser* (Linn.), *bernici* (Stephens), *nettapus* (Brandt), and a few others, are characterized by a moderately long neck, bill elevated at the base, as long as or shorter than the head, narrowing to the tip, which is chiefly formed by a large nail, and region in front of the eyes feathered; the long tibia and tarsus elevate the body more than in others of the family, making them good walkers on the land, while they are also excellent swimmers; the plates on the front of the tarsus are small and hexagonal, as in the swans, and are not transverse scutellæ as in the true ducks; the colors are rarely brilliant, white, black, and gray predominating, and both sexes, as in the swans, are colored alike. In the genus *cereopsis* (Lath.) the bill is very short, with a large and broad nail; it belongs to Australia, where it wanders on the land in search of grasses, on which it principally feeds, being never seen on the water; the only species (*C. Novæ Hollandiæ*, Lath.) is of a gray color, of the size of the common goose, and is said to be easily domesticated.—The genus *anser* (Linn.) is characterized by a bill as long as the head, mostly red or orange colored; the lamellæ of the upper mandible project below the edge of the bill as conical points; the nostrils open behind the middle of the commissure; the tip of the hind toe reaches the ground. The wild goose or gray-lag of Europe (*A. ferus*, Gesn.), the original of the common domesticated race, is of a gray color, with a brown mantle undulated with gray, and an orange bill. The bean goose (*A. segetum*, Gmel.) is by some considered a distinct species, and by others a mere variety of the wild goose; the wings seem to be longer, and the forehead is marked with white spots; whether a species or a variety, the bean goose is probably more or less mixed with the former in some of the domesticated races. Wild geese seek high latitudes in the breeding season and in summer, returning to the warmer parts of Europe in the winter; they are found mostly in meadows and marshes in the interior, where they feed in the daytime on aquatic plants, grasses, and grains; they walk well, and are very light on the water, on which they generally rest during the night; they do not dive, but plunge the head under water to the extent of their long neck; they are rapid and powerful fliers, migrating in two lines meeting at an acute angle; they are not polygamous, make their nests on the ground, and are very fond of their mates; the young are able to walk as soon as born, and feed of their own accord. The flight of wild geese is performed without noise, and with an or-

der which indicates considerable intelligence; each individual keeps its place in the ranks, the male bird at the head of the triangle or line, when it becomes fatigued, retiring to the rear, and the next one coming forward to take the leading and most fatiguing position. Their sight and hearing are acute, and while they feed or sleep a sentinel is always on the watch to give the alarm at the approach of danger. The awkward gait, outstretched neck, gaping mouth, and disagreeable voice have obtained for the goose the character of stupidity, while in reality it is remarkably intelligent. The flesh is not very wholesome nor digestible. The Chinese *tchin-tchu*, or Guinea goose (*A. cygnoides*, Gmel.), called from its size the swan goose, is more than 8 ft. long; the bill is orange, with a large knob or excrescence on the forehead; under the throat is a pouch, almost bare of feathers; the color above is pale grayish brown, with paler edges; a black line on the back of the neck; anterior neck and breast yellowish brown; belly white; sides over thighs gray-brown and white; in some varieties the bill, knob, and legs are black; the throat may be wattled, and the plumage mostly or entirely white. Originally from China, they have spread extensively over Asia, Africa, and Europe, and have been imported into the United States; they mix freely with the common goose, producing fertile hybrids; they are very noisy and easily alarmed; they walk erect, with the neck much elevated, more like a swan than a goose. Among the American species of the genus is the white-fronted or laughing goose (*A. Gambelii*, Hartl.), which has been separated from the European bird (*A. albifrons*, Gmel.) on account of the greater length of the bill. The length is 28



Laughing Goose (*Anser Gambelii*).

in., and the extent of wings 5 ft.; weight about 5½ lbs. The bill and legs are red; forehead white, margined behind with blackish brown; rest of head and neck grayish brown, paler on the throat; back and sides bluish gray, feathers anteriorly tipped with brown; breast

and belly grayish white, with brownish black tints, white in the anal region; tail brown, white tipped; secondaries and end of primaries dark brown, rest of wing silvery ash, the greater coverts edged with white. This species is found over the whole of North America, but is rare along the Atlantic coast; they retire to the north in March and April, returning in October; they are not so shy as other species, and their flesh is considered a delicacy; their food consists principally of land plants. The notes are loud, resembling a laugh; hence one of their common names. The egg is $2\frac{1}{2}$ by $1\frac{1}{2}$ in., of a dull yellowish green color, with indistinct darker patches. The snow goose (*A. hyperboreus*, Pallas) is larger, measuring 30 in. in length and 62 in extent of wings, with a weight of nearly 7 lbs. In the adult, the bill and legs are red; the general color pure white, with the primaries black toward the end and bluish gray at the base; the young, or blue-winged geese, have a more bluish and ashy tint, with patches of dark brown, constituting the *A. caerulescens* (Linn.), which some regard as a distinct species. It is found all over North America, breeding in the far north; when young, its flesh is tender, and far superior to that of the Canada goose; those that feed on the seashore have a fishy taste. The egg is yellowish white, 3 by 2 in. The usual food consists of grasses, rushes, insects, and in the autumn berries; it mates with the common goose, though the eggs are rarely if ever hatched.—The American wild or Canada goose belongs to the genus *ber-*



Canada Goose (*Bernicla Canadensis*).

niela (Steph.), which is characterized by a bill shorter than the head, and by the black color of the legs; the lamellæ of the upper jaw concealed by the margin of the bill; nostrils over the middle of the commissure; the hind toe elevated and rudimentary, not touching the ground. The species of this genus migrate from the high latitudes of Europe,

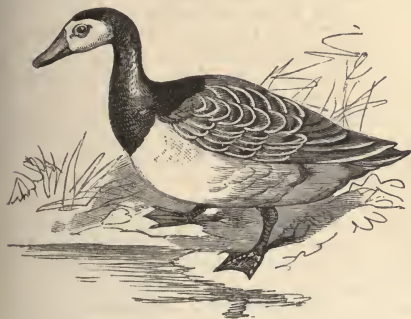
Asia, and America, where they spend the summer, to the more southern parts in winter, especially South America; they feed chiefly on marine grasses and algae, though some live far from water, eating seeds, berries, &c. The Canada goose (*B. Canadensis*, Linn.) is about 3 ft. long, with an extent of wings of 65 in., and a weight of 7 lbs. The head, neck, bill, feet, and tail are black; a large, triangular patch of white on the cheeks behind the eyes, confluent below; upper parts grayish brown, with paler edges; lower lid white; below grayish white, passing into pure white near the anal region; upper tail coverts white; primaries and rump dark brown. It is found throughout North America, and accidentally in Europe; the spring migration northward begins with the melting of the snow, from March 20 to April 30, and the return commences in the first half of September, the birds passing along the coast, but most numerous in the interior; their flight is very high, their "honk" often being heard when the bird cannot be seen, and very regular unless interrupted by fogs, storms, or unexpected accidents. The food consists of the seeds of grasses and aquatic plants, slugs and snails, worms, insects, tender blades of corn, and crustacea, shell fish, and marine plants on the seashore. They are not often found in company with other species; the senses of sight and hearing are very acute, and their stratagems for avoiding their enemies evince great cunning; they rarely dive, unless when attempting to escape, at which times both old and young quickly disappear. The males are very pugnacious during their courtship, and defend their mates against all enemies; the nest is built on the ground in some retired spot near the water, of dried plants; the eggs of the wild bird are usually about six, though the domesticated birds lay a few more; they average $3\frac{1}{2}$ by $2\frac{1}{2}$ in., are smooth, thick-shelled, and of a dull yellowish green color; the period of incubation is 28 days, and they have only one brood in a season; the young are able to follow their parents to the water in a day or two, but many are destroyed in spite of the watchfulness of the mother by snapping turtles, gar fish, pickerel, and birds and beasts of prey. They are shot from ambush at their feeding places, and may be attracted by living or artificial decoys; the flesh of such as have lived in the interior is very agreeable, but rather strong and fishy in the shore-fed birds. Besides man and the animals just mentioned, their worst enemies are alligators, the cougar, lynx, and raccoon, and the white-headed eagle. They are readily domesticated, and when tame are advantageously crossed with the common goose, the resulting brood being larger and more easily raised and fattened than the originals. The flesh and eggs are valuable as food, the feathers for beds, the quills for writing purposes, and their oil in domestic medicine. Hutchins's goose (*B. Hutchinsii*, Rich.), called by the gunners winter or flight goose, is 25 in.

long, with an extent of wings of 50 in., and a weight of about $4\frac{1}{2}$ lbs.; in its color it is precisely like the Canada goose; the eggs are pure white, 3 by 2 in.; it is found throughout the northern and western parts of America; its flesh is of excellent flavor. The *B. leucopareia* (Brandt),



Brant Goose (*B. brenta*).

from the west coast of America, is about 30 in. long, with an extent of wings of about 5 ft.; it resembles the Canada goose, but is smaller, and of a darker color, especially on the under parts. The brant goose (*B. brenta*, Steph.) is about 2 ft. long, with an extent of wings of 4 ft. and a weight of $3\frac{1}{2}$ lbs. This species may be known by the white crescent on the middle of the side of its black neck; the general color of the upper parts is brownish gray with lighter margins to the feathers; the wings and tail are darker, and the upper tail coverts white; lower parts grayish, passing into white behind. It is a salt-water bird, breeding in the north, and coming along the Atlantic coast on its return south in the middle of autumn; its flesh is considered a most savory food. It is shy, a good walker, an excellent swimmer, and, when

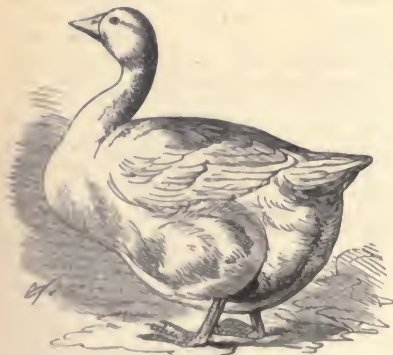


Barnacle Goose (*B. leucopsis*).

wounded, a most expert diver; its food consists of marine plants, mollusks, and crustaceans; it is easily tamed, and in captivity thrives well on grain, and produces young; the eggs are white. It is found on the Atlantic coasts of North America and Europe. It is replaced on the Pacific

coast by the black brant (*B. nigricans*, Lawr.); the anterior part of the body of the latter is black, the rest dark plumbeous, with white patches on the throat, sides of rump, and tail coverts; the bill is wider than in the common brant. The barnacle goose (*B. leucopsis*, Bechst.) is 28 in. long, with an extent of wings of $4\frac{1}{2}$ ft., and a weight of a little over 4 lbs.; the forehead, cheeks, and lower parts are white, the belly with a bluish tint; the crown, neck, anterior back, rump, and tail black; mantle ash-colored. It is common in winter in northern Europe, especially on the western shores of Great Britain, but is doubtful as an inhabitant of the United States; it is a salt-water species, very shy, and highly esteemed as food; the eggs are yellowish cream-colored, about 3 by 2 in. It owes its name of barnacle goose to the belief long entertained that it was produced by the barnacle, a cirriped articulate animal often found adhering to old wood; an opinion expressed so lately as 1636 by Gerard, in his "Herbalist." It has also been called tree goose from the belief that it originated from old and decayed trees.—There are several large species of geese in South America, of which the most remarkable are the antarctic (*B. antarctica*, Gmel.), the males snowy white, and the females black with transverse lines; and the Magellanic (*B. Magellanica*, Gmel.), ferruginous brown and black, with white wing coverts, and bar on tail. The painted goose (*B. Canagica*, Bon., or *picta*, Pall.), of large size, of a bluish gray color, with head, nape, and tail white, black throat with white dots, and quills with a black stripe anterior to the white tip, is common in the Aleutian islands, and is doubtless also found on the N. W. coast of the United States.—The last genus of *anserina* is *nettapus* (Brandt), found in the lakes, rivers, and estuaries of continental India, Africa, and Australia. The bill is small and elevated, with short and widely set lamellæ; the nostrils basal; wings moderate and pointed; tail short and rounded; the species are of small size. Mr. Blyth says that "the Indian species seems totally incapable of standing or walking on the ground, but invariably flutters along it in a strange, scuffling manner, like a wounded bird; they always descend into the water, never alighting on the ground of their own accord." The Coromandel goose (*N. Coromandelianus*, Gmel.), of the size of a teal, has the head and neck white with black spots; crown black; lower neck with black lines; above brown with a greenish and reddish gloss; beneath white.—Prof. Baird places the genus *dendrocygna* (Swains.) in the goose family, but most authors rank it with the *anatina* or ducks; it is allied to the geese more than to the ducks by the elevated base and large nail of the bill, the long legs, and the hexagonal scales in front of the tarsus; he describes three species as inhabiting the United States.—The common tame goose is the European wild bird domesticated, from which it varies considerably in color,

though less than ducks and fowls do from their wild originals; it tends to a general gray color, though the vent and upper tail coverts are always white; the males are sometimes entirely white, and the females generally cinereous and gray. In England, Lincolnshire is famous for the raising of geese; on the continent, Hamburg, Bremen, and Emden, and their neighborhoods, raise the best breeds. The usual weight of a fine goose is 15 or 16 lbs., and by cramming with nourishing food this weight may be doubled; by confining the bird, to prevent motion, and employing fattening diet and stupefying substances, the body becomes loaded with fat, and the liver becomes enlarged and fatty with disease, forming the principal ingredient in the *pâté de foie gras* so much esteemed by epicures. Geese are in the best condition for the table about Christmas time; in England the feast of St. Michael, and on the continent that of St. Martin, are almost universally celebrated by roast goose. Before the days of metallic pens, goose quills formed a considerable article of trade, the living bird being stripped once and sometimes twice a year for this purpose; the value of the feathers for beds and pillows is well known, the living birds being plucked from three to five times in a year, at which periods, if cold weather come on, many die; if well fed and cared for, a goose will yield about a pound of feathers in a season. They generally breed only once a year, laying every other day, and depositing 7 or 8 eggs; incubation is about 30 days, and the female will sometimes produce enough for three broods, if the eggs are taken away in succession; they begin to lay early, are close sitters, and careful of their young; they grow fast, are little liable to disease, and are fattened by grain in a short time; when in a locality where they can pick



Bremen Goose.

up much of their food, they are profitable to raise for their flesh and that of the goslings, for their quills, and especially for their feathers. In the United States the common tame goose of Europe, in which the ganders are white and the females gray, is the most numerous, and

perhaps as profitable as any. The white Bremen goose is of larger size, handsome, and easily raised, but less prolific and hardy. The China or tchin-tchu goose, with its variety the Guinea or African goose, is very large and swan-like, at maturity weighing 50 lbs. per pair. A cross between the last and the Bremen bird, called sometimes the mountain goose, is highly prized for the table, and attains a weight of 35 or 40 lbs. per pair; it comes to maturity early, and can be reared in 16 weeks to a weight of 14 lbs., dressed. The Canada goose is sometimes tamed, especially in northern and thinly settled localities; it mixes with the common goose, though of a different genus, and the mongrels, which are not prolific, are considered a great delicacy. The goose is a very long-lived bird, its age having been known to equal 100 years. It is probable that many wild species, in different parts of the world, might by a little care be brought into a state of domestication, and thus increase the number of these useful birds.

GOOSEBERRY (*ribes grossularia*, Linn.), the name of a familiar garden fruit of small size. The original species is indigenous to England, France, Germany, and Switzerland, and has been found in the Himalayas, and on the banks of the Ganges (Royle). The cultivation of the gooseberry in gardens was first successfully undertaken by the Dutch; but up to the time of Miller it had gained but little reputation as a table fruit in England. Some suppose that the name originated from the use of the berry as a sauce for the goose; but Pryor states that it comes through the German *Kreuzbeere* from the Swedish *Krusbär*, meaning "frizzle berry" and "cross berry," the last having allusion to the triple spine, which is sometimes in the form of a cross. The gooseberry is represented in the United States by several species, of which the most common is the wild gooseberry (*R. cynosbati*, Linn.), with large berries armed with long prickles like a bur, or rarely smooth-skinned; it is found from Canada to the Rocky mountains near the sources of the Platte river; its fruit is pleasant to the taste. The commonest smooth gooseberry of New England is the *R. hirtellum* (Mx.), with small, smooth, purple, sweet fruit. Another species, *R. rotundifolium* (Mx.), grows upon rocky places in western Massachusetts, and extends to Wisconsin, and southward along the mountains to Virginia; this bears a smooth-skinned, pleasant fruit. The swamp gooseberry (*R. lacustre*, Poiré) is found in mountain swamps from Massachusetts and New York to the arctic circle, and, according to Douglas, in the mountains of Oregon and northern California; this species differs from others in its many-flowered racemes; its fruit is dark purple, and is unpleasant to the taste. The cultivation of the foreign varieties of the gooseberry is somewhat difficult in this country, in consequence of dry weather in the early summer succeeding the rains of the spring; and when the atmosphere is moist,

though the soil is dry, the berries become overgrown with an insidious mildew (*erysiphe mors uva*, Schw.), which effectually prevents their perfect growth. Repeated application of a wash made with flowers of sulphur and lime will alone destroy this mildew, and save the

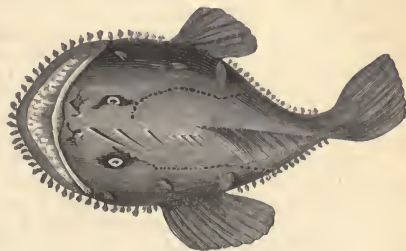


Gooseberry (*Ribes grossularia*).

crop; but the trouble is generally considered too great for the result. A variety or hybrid, with good-sized berries of a greenish purple color and pleasant flavor, called "Houghton's seedling," originating in the vicinity of Boston, is free from the attacks of this fungus; this variety furnishes the greater part of the fruit sold in our markets. The cluster, Downing, and mountain seedling are other American varieties. The fruit in our markets is almost invariably sold in the green state for cooking purposes. The European varieties are seldom seen in this country except in the gardens of amateurs. In some of the manufacturing towns of England the operatives have gooseberry societies and hold exhibitions, the fruit being judged by weight. The gooseberry thrives best in a rather cool and partially shaded aspect; and it has been observed that the direct rays of the sun striking upon the bushes and fruit, when grown near walls and fences, cause the berries to scald, so that they fall, so rapid is the evaporation from its succulent tissues.

GOOSE FISH, an acanthopterous fish of the lophioid family, which contains some of the most hideous and voracious of the class. It belongs to the genus *lophius* (Artedi), characterized by a head enormously large, broad, and flat; the body slender, smooth, with two separate dorsal fins; the mouth very wide, the lower jaw the longer, armed with numerous movable, sharp, conical, recurved teeth on the jaws, palate, vomer, and pharyngeal bones; tongue smooth; branchial rays six, and branchial arches three. Numerous fleshy appendages or *cirrhi* are arranged along the edge

of the lower jaw, the pectoral fins, and to the base of the tail; there are several spines upon the head, two just behind the snout, others over the eyes and at the back part of the skull; the anterior rays of the dorsal, situated on the head, are separated as two slender tentacles, the first generally with a fleshy appendage, joined to the skull by bony rings, and capable of free motion at the will of the animal. The pectorals are elongated into a kind of arm, the rays representing fingers, by which some members of the family are enabled to move as upon legs; hence Cuvier's name of *pectorales pediculati*; these fins are large and digitate at the end, and behind and beneath them are the large branchial apertures; the ventrals are stout and fleshy, considerably in front of the pectorals; the tail is stout and digitate at the end. The eyes are large and oval; the nostrils are peculiar in being placed at the end of an erectile tube, the summit of which expands like the cup of a flower, and which is directed toward any odorous object. The skeleton is fibrous rather than bony; the stomach is very large and muscular, and the intestine short; the spinal cord is as long as in other fishes, but is remarkably reduced in size below its anterior third, while the nerves which arise from it form a large bundle within the spinal canal, completely concealing the cord. There are five species described, of which the *L. Americanus* (Cuv.) and *L. piscatorius* (Linn.) are the best known. The American goose fish grows to a length of 4 or 5 ft., varying in weight from 15 to 70 lbs. Its appetite is most voracious, and it feeds upon all kinds of fish; entire sea fowl, such as gulls and ducks, have been found in its stomach; it is occasionally taken by the hook and in nets, but is good for nothing, not even its liver containing much oil. Being a poor swimmer from the feebleness of its pectoral fins, it remains hidden in the mud or sand, waving its fleshy appendages, which fishes mistake in the turbid water for food, and are thus drawn within the reach of its ca-



Goose Fish (*Lophius Americanus*).

pacious gape. From this habit of fishing, it has been called angler and fishing frog, and from its hideous appearance and immense mouth, sea devil, wide gab, and devil fish. The color of the *L. Americanus* is dark brown, sometimes in blotches, and dirty white below.

The *L. plantaginifolia* is not uncommon in the zone of Europe, where it grows to the length of from 8 to 5 ft.; the color is brown above, the fins darker, with the under surface white.

GOPHER, the common name of two very different American animals, the one composing the rodent genera *geomys* and *thomomys*, the other the large land tortoise, *testudo polyphemus*, of the southern states (see TORTOISE); where the name is used for the latter animal, the rodents are almost universally called salamanders. On account of this confusion of names, it is necessary to ascertain the region of country of a speaker or writer before it can be known whether a mammal or a reptile is referred to. In Illinois and other western states the term gopher is also given to other rodents of the genus *spermophilus* (Cuv.), which will be noticed under their proper name of PRAIRIE SQUIRRELS. The rodent gophers, or pouched rats, as they are often called, constitute the subfamily *geomyiinae*, characterized by large external cheek pouches, hairy naked upper lip, molars $\frac{1}{2}$ — $\frac{3}{4}$, great development of temporal bones, massive skull and lower jaw, very large and thick incisors, small ante-orbital foramen far forward on the side of the muzzle, broad occiput forming the posterior wall of the skull, and remarkable contraction between the orbits, where the bones are narrower than the snout; the palate is horizontal between the molars, rising rapidly in front of them to near the incisors, leaving a deep concavity between them and the molars; the body is thick-set and clumsy, the limbs equal and very short, the claws on the fore feet enormously developed for digging purposes. They are subterranean and nocturnal animals, rarely seen, and confined to North America; they are very abundant in certain districts west of the Mississippi; their colors vary much with age and season. The genus *geomys* (Rafinesque), or *pseudotomomys* (Say), in addition to the above family characters, has the anterior surface of the upper incisors marked with one or two grooves, the crown of the rootless molars with an elliptical outline, very thick zygomatic arches, the lower outline of the under jaw a curve mostly parallel to the inferior surface of the incisors, the bones of the fore leg stouter than those of the posterior, and the clavicles well developed; the eyes are small and far apart, the ears hardly perceptible; no appearance of neck, the thickest part of the animal being about the head; the opening of the mouth very small, with a chamber between the incisors and molars lined with skin and mostly covered with short hair; the lower lip tumid and very movable. The cheek pouches cover the sides of the head, extending back to the middle of the scapula, and are capable of great distention; they are well clothed with hair on the side next to the head, and on the other nearly naked; they always open outside, and never communicate with the mouth; the body is covered with soft hair; the tail is thickened, hairy, tapering toward

the tip, which is naked for about half an inch; the feet are five-toed, covered with hair above, smooth and tumid below, with a large tubercle on the palm; the fingers and toes may be completely flexed; the claws are long, curved, compressed, and sharp below, smaller, thicker, and conical on the hind feet. The species are mostly found east of the Rocky mountains, and are very abundant in Missouri, Illinois, and Iowa; they are also found in Canada, Texas, Mexico, and the gulf states, but not on the Atlantic coast north of the Savannah river. The pouched gopher (*G. burmanni*, Shaw) is from 8 to 10 in. long, the tail $2\frac{1}{2}$ to $3\frac{1}{2}$, and the weight from 12 to 14 oz. The prevailing color is reddish brown above, ashy brown beneath, with the feet white; in the warm season, and in young animals, the general color is plumbeous. They burrow in sandy soils, throwing up the earth in little mounds by means of the back and shoulders; they feed on grasses, roots, nuts, &c., which they carry to their holes in their pouches; they are injurious to vegetation by eating the roots of trees, shrubs, grasses,



Pouched Gopher (*Geomys burmanni*)

and vegetables; they remain inactive in cold weather; the female brings forth from five to seven at a birth in the spring. In the region of the upper Missouri they are called mulcoos; the generic name given by Rafinesque means "earth mouse," and that by Say "false mouth," the one indicating its burrowing habits, the other the capacious cheek pouches. They are common in Canada, and as far as lat. 53° N. The southern gopher, Georgia hamster, or salamander (*G. pinetis*, Raf.), is a large species, having a single deep groove on the upper incisors; the fore feet are longer than the hinder, the tail naked nearly to the base, and the color above plumbeous brown, ashy white beneath; it is found in Alabama, Georgia, and Florida. Five other species are described by Prof. Baird in the "Report of the Pacific Railroad Expeditions," vol. viii., from the western states, Mexico, and Texas.—There are several species of gopher, found principally on the Pacific coast of the United States, belonging to the genus *thomomys* (Maxim.), which differs from *geomys* in the nearly smooth anterior surface of the upper incisors, in the ovate crowns of the molars, less massive skull, and the fore feet

being considerably shorter than the hind ones. The California gopher (*T. talpivorus*, Rich.) is the largest of the genus, though an inch or two less than the *G. burserianus*; the color above is reddish chestnut brown, with dusky tips to the hairs, paler beneath, and tail grayish



California Gopher (*Thomomys talpivorus*).

1. Front view of mouth, teeth, and jaws. 2. Hind paw.
3. Fore paw. 4, 5. Nails of fore and hind foot.

white. It is very annoying to the farmer and horticulturist, and its destructive propensities have caused it to be baited with traps and poisons on all possible occasions; phosphorus and strychnine seem to be the most successful.

GÖPPERT, Heinrich Robert, a German botanist, born at Sprottau, July 25, 1800. He studied pharmacy and medicine, and has been since 1831 professor of botany and medicine at the university of Breslau. He has published many important works on botany and fossil flora, including *Ueber die fossilen Farnkräuter* (Breslau, 1836); *Die Gattungen der fossilen Pflanzen verglichen mit denen der Jetztzeit* (Bonn, 1841-'2); *Index Palaeontologicus* (Stuttgart, 1848-'50); *Ueber die fossile Flora der silurischen, der devonischen und unteren Kohlenformation* (Jena, 1860); and *Ueber Strukturverhältnisse der Steinkohle* (Breslau, 1868). His private collection of specimens of fossil flora is considered the finest in the world, and the botanical garden and museum in Breslau have become under his management model institutions.

GÖPPINGEN, a town of Württemberg, on the Fils, 21 m. E. by S. of Stuttgart; pop. in 1871, 3,649. It contains a fine parish church, and an old castle with a winding stone staircase, known as *Traubensteig* or "grape staircase." There is a brisk trade in wool, and manufactures of woollen and linen, toys, carriages, and other articles. About 5 m. S. of Göppingen is the watering place of Boll, with cold sulphurous springs, and a bath house belonging to the crown; and about 3 m. N. E. of the town the ruined castle of Hohenstaufen, once the seat of the Swabian house of German emperors.

GORDIAN KNOT. See **GORDIUS**.

GORDIANUS. I. Marcus Antonius, surnamed **AFRICANUS**, a Roman emperor, born in Rome A. D. 168, died in Carthage in 238. He was descended on his father's side from the Gracchi, and on his mother's from the emperor Trajan, and possessed more extensive estates than those of any other private citizen. He was first made consul in 213, and was afterward proconsul of Africa. In his 80th year he was compelled by the leaders of the rebellion against the procurator of Maximin to assume at Carthage the imperial title. The intelligence was welcomed by the senate, which at once proclaimed Gordianus and his son Augustus, and declared Maximin a public enemy. Meantime Capellianus, procurator of Numidia, who had recently been suspended from office by Gordianus, marched with a well trained army against Carthage. The younger Gordianus met him with undisciplined forces, and was defeated and slain; and his father thereupon died by his own hands, after a nominal reign of less than two months. **II. Marcus Antonius Pius**, emperor of Rome, grandson of the preceding, born about A. D. 224, died in 244. He was proclaimed Cæsar at Rome after the death of the two Gordians in Africa, was colleague of the two new emperors Balbinus and Maximus, and after their murder by the praetorians in 238 was proclaimed emperor by the senate and the troops. During a part of his reign he was supported by the abilities of Mithrens, whose daughter he married, and carried on a war against the Persians, whom he defeated in a series of engagements in Mesopotamia in 242. Mithrens died soon after, and was succeeded in command by Philippos, an Arabian, who, by raising discontent among the troops advancing into Persia, caused Gordianus to be murdered, and himself proclaimed emperor.

GORDIUS, a legendary king of Phrygia, father of Midas. He was originally a peasant, but an eagle having alighted on his yoke of oxen while he was ploughing, and remained there till evening, this was taken as a presage of the future greatness of his house. To learn the meaning of the sign, he went to consult the soothsayers of Telmessus. A prophetess whom he met at the entrance of the place gave him the necessary information concerning the sacrifices, and afterward became his wife. When their son Midas had reached the age of manhood, the country was disturbed by civil dissensions, and an oracle declared that a car would bring the people a new king, and with him the end of their disturbances. While they were deliberating, Gordius with his wife and son unexpectedly appeared on a car in the assembly, and was hailed king. According to another tradition, Midas was elected king. The new ruler consecrated the yoke of his team to Zeus Basileus in the acropolis of Gordium, and an oracle declared that whosoever should untie its artfully made knot would become master of Asia. Alexander is related to have cut it asunder with the sword on his march to Persia.

GORDON, a N. W. county of Georgia, watered by the Oostenaula river and several other streams; area, 330 sq. m.; pop. in 1870, 9,268, of whom 1,536 were colored. It has a hilly surface, underlying which are beds of blue limestone. The soil is fertile. The Western and Atlantic railroad traverses it. The chief productions in 1870 were 96,181 bushels of wheat, 233,785 of Indian corn, 15,827 of oats, 11,214 of sweet potatoes, 80,316 lbs. of butter, and 354 bales of cotton. There were 936 horses, 3,416 cattle, 4,056 sheep, and 7,958 swine. Capital, Calhoun.

GORDON, George, commonly called Lord George Gordon, an English political agitator, born in London in December, 1750, died in Newgate prison, Nov. 1, 1793. He was the third son of Cosmo George, third duke of Gordon, and at a very early age entered the navy, from which he retired in 1772. He was remarkable for his personal attractions, his winning address, and happy facility of adapting himself to the tastes of all classes. In 1774 he entered parliament for the borough of Ludgershall. For a year or two he voted with the ministry, but in 1776 vehemently opposed them in a speech in which he alleged that an attempt had been made to bribe him. The ministry subsequently endeavored to persuade him to resign his seat in parliament and accept the place of vice admiral of Scotland; an offer which he resolutely declined. From this time he ceased to act with either whigs or tories, but spoke with so much effect upon the proceedings of either side, that it became a common remark that "there were three parties in parliament, the ministry, the opposition, and Lord George Gordon." In 1779 the proposition to procure from parliament an act for the relief of Scottish Roman Catholics, similar to Sir George Saville's act passed the previous year with reference to England and Ireland, caused an extraordinary excitement; and in November a society was organized in London under the name of the "Protestant Association," of which Gordon was elected president. Early in 1780 he presented a petition praying for a repeal of Sir George Saville's act; but finding the government indifferent to the application, he convened a meeting of the association on the evening of May 29, and enjoined them to meet on the succeeding Friday (June 2) in St. George's fields and carry up their petition to parliament for the repeal of the act. On the day appointed a concourse of people, estimated at nearly 60,000, assembled in St. George's fields, and accompanied him to the houses of parliament, which they completely surrounded. The house having several times refused to take the petition into immediate consideration, Gordon addressed the mob from the top of the gallery stairs, naming the members who had spoken against the measure, and protesting that "there would be no help for the Scottish people till all the popish chapels were destroyed." At a late hour in the even-

ing they proceeded to the chapels of the Sar-
dinian and Bavarian legations, which they sacked. On Sunday, the 4th, they renewed their violence, and from the evening of that day until the morning of Thursday, the 8th, the city was almost entirely at their mercy. The prisons were broken open, the public buildings attacked, the houses of Lord Mansfield and of many Roman Catholics pillaged and burned, and at one time on the 7th 36 fires were raging within the limits of London. On the evening of that day troops began to pour into the city from all sides, and on the next afternoon the famous "Gordon" or "no popery" riots were finally quelled, after more than 450 people had been killed and wounded by the military, exclusive of a number killed by accident. On the 9th Gordon was arrested on a charge of treason, and committed to the tower. His trial came on in February, 1781, and the prisoner, owing to his eloquent and skilful defence by Erskine and Kenyon, was acquitted on the ground that his intentions in assembling the people were not malicious or traitorous. In 1788 he was sentenced to several years' imprisonment, and to pay heavy fines, for having libelled the administration of criminal justice in England, and the queen of France. About this time he had become a proselyte to Judaism. He continued to send forth from his prison handbills and letters of an eccentric character, and petitioned the national assembly of France to procure his release, but without effect. He died of a delirious fever, having been in all probability insane during the last ten or twelve years of his life.

GORDON, Sir John Watson, a Scottish painter, born in Edinburgh about 1790, died in 1864. He received his professional education in Edinburgh, and devoted himself exclusively to portrait painting. Among his portraits are those of Scott, De Quincey, and Wilson. In 1850 he became president of the royal Scottish academy, and was made painter limner to the queen; and in 1851, having been knighted, he was made a member of the London academy.

GORDON, William, an English clergyman, born at Hitchin about 1730, died in Ipswich in October, 1807. He removed to America in 1770, was ordained minister of the third church in Roxbury in 1772, and became chaplain to the provincial congress of Massachusetts. Returning to England in 1786, he published his "History of the Rise, Progress, and Establishment of the Independence of the United States of America" (4 vols., London, 1788).

GORE, Catharine Grace, an English novelist, born in Nottingham in 1799, died Jan. 29, 1861. Her maiden name was Francis. In 1822 she married Capt. Charles Gore, and in the following year published her first novel, "Theresa Marchmont." This was followed by several other novels and tales, up to 1831. She passed the five succeeding years on the continent, writing little; but in 1836 she fairly began her career as an author. She brought out nearly

70 works under her own name, besides several which were published anonymously. Of her novels the best known are "Mrs. Armytage," "The Diary of a Désennuyée," "Cecil, or the Adventures of a Coxcomb," and its sequel, "Ormington, or Cecil a Peer," "The Banker's Wife," "Pin Money," "Peers and Parvenus," "Preferment, or my Uncle the Peer," "Temptation and Atonement," "Mother and Daughter," "Opera, a Tale of the Beau Monde," "Woman of Business," and "Woman of the World." Among her other works are "Paris, Picturesque and Romantic," "Sketch Book of Fashion," "Sketches of English Character," several translations from the French, among which is the "Rose Fancier's Manual," and a number of dramas. Her last work was "The Two Aristocracies" (1857).

GORE, Christopher, an American statesman, born in Boston, Sept. 21, 1758, died at Waltham, March 1, 1827. He graduated at Harvard college in 1776, studied law, and was soon engaged in good practice. In 1789 he was appointed the first United States district attorney for Massachusetts; in 1796 he was chosen one of the commissioners to settle the claims of the United States upon Great Britain for spoiliations, and remained in London, successfully engaged in the duties of this office, about eight years; in 1803 he acted as chargé d'affaires; in 1809 was chosen governor of Massachusetts; and in 1814 was elected to the United States senate, where he served about three years. He left the most of his property to Harvard college.

GORÉE, a small island belonging to France, on the W. coast of Africa, $1\frac{1}{2}$ m. S. of Cape Verd, and separated from the continent by the strait of Dacar; pop. about 5,000. It is 3 m. in circumference, and is nothing more than a basaltic rock, which in some places is several hundred feet high. The fort occupies an elevated flat near the centre of the island, and the town a sandy plain at the foot of the rock. The roadstead is well sheltered, and affords safe anchorage for eight months of the year. The climate is healthy. In 1869 the imports amounted to 10,692,000, and the exports to 7,270,000 francs; there were 578 arrivals of vessels, and 600 clearances.

GORGES, Sir Ferdinando, lord proprietary of the province of Maine, born in Somersetshire, England, died at an advanced age in 1647. He was a partner in the conspiracy of the earl of Essex, against whom he testified on his trial in 1601. During the war with Spain he served in the navy, and after the peace, in 1604, was appointed governor of Plymouth. When Weymouth returned in 1605 from his voyage to North America, and brought with him five Indian captives, Gorges took three of them into his house, caused them to be instructed in the English language, obtained information from them of their native country, and determined to become a proprietor of domains beyond the Atlantic. He persuaded Sir John Popham,

lord chief justice of England, to share his intentions, while at the same time influential persons in London were desiring to renew the attempts which had been made by Raleigh in Virginia. A joint application was arranged, and in 1606 the king incorporated two companies, the first called the London colony, and the second the Plymouth colony, between which was divided the territory extending 50 miles inland from the 34th to the 45th parallel N. lat. The Plymouth colony had the northern portion, which was styled North Virginia. An exploring ship was sent out by Gorges, but was captured by the Spaniards. Three ships with 100 settlers sailed from Plymouth, May 31, 1607, and reached the mouth of the Kennebec in Maine, where they began a settlement, which was abandoned the next spring. In 1614 Gorges engaged Capt. John Smith, who had already visited North Virginia (which he called New England), in the service of the Plymouth company. He set sail for New England with two ships in March, 1615, but his own was dismasted and returned to port, and Capt. Dermer in the smaller vessel made the voyage, but soon returned. Other attempts of Smith were unsuccessful, but in 1616 Gorges sent out a party, which encamped on the river Saco through the winter, and in 1619-'20 Capt. Dermer again made the voyage. In 1620 Gorges and his associates obtained a new incorporation for "the governing of New England in America," which was empowered to hold territory extending westward from sea to sea between the 40th and 48th parallels N. lat. Gorges himself united with John Mason in taking grants of the district called Laconia, bounded by the Merrimack, the Kennebec, the ocean, and "the river of Canada," and under his auspices several settlements were attempted. His son, Capt. Robert Gorges, was appointed in 1623 by the council for New England "general governor of the country." This council resigned its charter to the king in 1635, surrendering the administration of its domains to a governor general to be appointed by him, and Gorges vainly expected this appointment. He now determined to establish a miniature sovereignty on his own domain. To this end he obtained from the king a charter constituting him lord proprietary of the province of Maine, with extraordinary governmental powers, which were to be transmissible with the property to his heirs and assigns. He sent his son Thomas to be deputy governor, and the officers took an oath of allegiance to the lord proprietary. The province was divided into two counties, of which Agamenticus (now York) and Saco were respectively the principal settlements; the former received a city charter as Gorgeana in 1642. When the four New England colonies formed a confederacy in 1643, the settlements of Gorges were excluded from it, "because," says Winthrop, "they ran a different course from us both in their ministry and their civil administration," and because the proprie-

tary was then in arms in England for the king against the cause of the Puritans. On his death the people repeatedly wrote to his heirs; but as no answer was received, they at length formed themselves into a body politic for the purposes of self-government, and submitted to the jurisdiction of Massachusetts.—His grandson FERDINANDO, born in 1629, published "America Painted to the Life" (London, 1659), sold to Massachusetts in 1677 his proprietary rights to the province of Maine for £1,250, and died Jan. 25, 1718.

GÖRGEY, or *Görgei, Arthur*, a Hungarian general, born in the county of Zips, Feb. 5, 1818. He entered the military school at Tüln, and subsequently the royal Hungarian noble life guards at Vienna, and was appointed lieutenant in the regiment of Palatine hussars. He soon left the army to devote himself to chemical studies at Prague. He spent the spring of 1848 without any participation in the early events of the Hungarian revolution; but when the insurrections of the non-Magyar tribes in the south of Hungary had compelled the Hungarian ministry to declare the country in danger, he offered his services to the national government. In August he received the command of the national guard of the circle W. of the Theiss, and was sent to the island of Csepel, formed by the Danube, to defend that line against the Croats of Ban Jellachich. The ban having been defeated at Pákozd, and having fled toward Vienna, Görgey operated with Perczel against the Croatian corps, which finally surrendered at Ozora (Oct. 7). Kossuth then sent him as colonel to the army of the upper Danube, which was about to cross the frontier for the deliverance of Vienna; and after the defeat at Schwechat, near Vienna (Oct. 30), he made him general-in-chief of the whole army which was charged with defending the frontier. Görgey's force was unfit to maintain a long line of defence against the superior and victorious army of Windischgrätz, and on the approach of that general he abandoned the frontier and retreated toward Buda, which was also abandoned to the enemy early in 1849. Görgey then crossed the Danube at Pesth, and marched toward the Waag. German in all except name and descent, he had no sympathy with Kossuth and the other revolutionary leaders, and on reaching Waitzen issued a manifesto in the form of a "declaration of the royal Hungarian *corps d'armée* of the upper Danube," which was directed quite as much against the republican tendencies of Kossuth and his associates as it was against the unconstitutional reign of Francis Joseph, who had just been declared emperor. This manifesto, which was followed by acts of insubordination on his part, caused Görgey to be suspected of treacherous designs. He was, however, protected by the various perplexities of the government, and the sympathies of his army. But his situation was not less critical than that of the government. His army, consisting of about 15,000 men, was soon

hemmed in, in the midst of winter, among the mountain towns of the mining district. The offensive march westward was given up, and a retreat toward the upper Theiss commenced. After the defeat of Guyon at Windschacht (Jan. 21), and of Görgey at Hodries (Jan. 22), all the three divisions of the army were on the brink of destruction, and all escaped as by a miracle, effecting their junction at Neusohl. Separating again, they marched toward the northernmost Hungarian region of the Carpathians, and entered Zips, Görgey's native county, at the beginning of February. Having here been surprised at Igló on the night between Feb. 2 and 3, and suffered some considerable loss, Guyon soon after (Feb. 5) saved the army by his victory on Mount Branyiszko over a division of Schlick's corps, which opened a junction with the Hungarian corps under Klapka on the upper Theiss. Görgey, who had neglected communication with the government at Debreczin, and disbelieved the non-official reports of the successful operations of Klapka, too late concerted with the latter a common plan of attack, and thus missed the opportunity of crushing Schlick's corps at Kaschau. Arrived in that town, Görgey received an order placing him, like Perczel and Klapka, under the Polish general Dembinski, as commander-in-chief of the united Hungarian main army. Görgey immediately began intrigues against the foreign generalissimo, which much deranged the offensive plans of the latter. Dembinski doubted the fidelity of Görgey; the latter had no confidence in the ability of his superior. The unfavorable issue of the two days' battle of Kápolna (Feb. 26, 27) was ascribed by the one to unskilful dispositions, by the other to treacherous slowness in execution. The chief officers of the army, mostly partisans of Görgey, openly declared their want of confidence in Dembinski; the government was forced to yield, and after a few weeks of interregnum Görgey was appointed general-in-chief of the united main army, which was again to take the offensive against Windischgrätz. Crossing the upper Theiss, he began his march on the line of operation chosen by Dembinski, but with greater success. The whole campaign was an uninterrupted series of victories, which destroyed the finest imperial troops in Hungary, freed Pesth, and rescued the fortress of Comorn. The road to Vienna was open, but Buda had still to be conquered. Görgey undertook the latter task, but when he had executed it (May 21) the Russian armies were already approaching the frontiers of Hungary, and the opportunity of striking a decisive blow at Austria in its capital was lost. Kossuth now conferred upon Görgey the title of lieutenant field marshal, which he refused to accept. He set himself in opposition to Kossuth's republican plans; and having strengthened his personal position by assuming also the duties of minister of war, and by the removal from his army of some of the most independent and ablest of his generals,

he recommenced the offensive against the Austrians simultaneously with the invasion of the Russians. Political rather than strategical reasons led him to choose the left bank of the Danube as a basis of operations, and he changed his plan only after a series of bloody and fruitless struggles on the Waag and Danube (June 16, 20, 21). On the right bank of the latter river his army was forced to give up Raab (June 28), and he was obliged to retreat into the fortified camp at Comorn, where he gained more glory than success in the great battle of Szőny (July 2), in which he was wounded. At this juncture, when Russians and Austrians were advancing from every quarter, a concentration of the main armies on the Theiss was resolved upon at Pesth; Mészáros received the nominal, and Dembinski the virtual command in chief; the capital was again evacuated, and Görgey was finally compelled to sacrifice his plans. Leaving a part of his army under Klapka at Comorn, he retreated toward Waitzen, where he fought (July 15) against the Russian main army under Paskevitch; but being unable to break through it, he took his direction toward the upper Theiss, and defeated the Russians on the Sajó (July 25) and on the Hernád (July 28). The division of Nagy-Sándor was soon after surprised and defeated at Debreczin (Aug. 2); and when Görgey finally reached Arad, the last appointed place of concentration, as well as the last seat of the Hungarian government, his army alone was still able to fight, all the others which had been ordered there having been defeated and dispersed; Bem had lost Transylvania. But to resist with success the overwhelming forces of Paskevitch and Haynau was now impossible. Having summoned Kossuth to resign, and been himself invested (Aug. 11) with supreme civil and military powers, Görgey informed the Russian general Rüdiger of his intention to surrender his army, relying for the fate of his men on the magnanimity of the czar. The surrender took place at Világos, Aug. 13, 1849, when 20,000 infantry and 2,000 cavalry laid down their arms. The generals and soldiers were then delivered by the Russians to the Austrians, the former to be executed at Arad (Oct. 6), the latter to serve a new term in their army. Görgey was spared at the intercession of the czar, and carried as captive to Klagenfurth, where he resumed his chemical studies, and wrote *Mein Leben und Wirken in Ungarn in den Jahren 1848 und 1849* (Leipsic, 1852; English translation, "My Life and Acts in Hungary," London, 1852). On the restoration of the Hungarian constitution in 1867, he returned to his country, and in 1869 published anonymously *Magyarország 1849-ben és 1866 után* ("Hungary in 1849 and after 1866"), a review of the situation from a politico-strategical point of view.

GORGIAS, a Greek rhetorician and sophist, born in Leontini, Sicily, about 487 B. C., died about 380. He was a disciple of Empedocles and Prodicus, and first appears in history in

427, when he was sent to Athens to beseech succor for the Leontines attacked by the Syracusans. He spent the remainder of his life chiefly in Greece. He not only captivated the Athenian populace by the splendor of his eloquence, but gained Alcibiades, Alcidas, Æschines, and Antisthenes for pupils or imitators. Plato gave his name to the dialogue which he composed against the sophists. The views of Gorgias were set forth in a work "On Nature," which was early lost, but of which considerable extracts still exist. A full account of it is given by Theophrastus. The book was divided into three sections. In the first he argued that nothing had any real existence; in the second, that if there were a real existence, it was not in man's power to ascertain it; in the third, that existence, even if real and ascertainable, could not be communicated. To prove these points, he made use of the conclusions of the Eleatics, which however he did not fully accept. Sextus Empiricus also gives a clear description of the work of Gorgias. The charm of his oratory is said to have consisted largely in a profusion of metaphors and a poetical choice and arrangement of words. According to Plato, he expressly declared that he did not profess to impart virtue, but only the power of speaking eloquently.

GORCONA, an island in the Pacific, 30 m. from the coast of the United States of Colombia, to which it belongs; lat. 2° 51' N., lon. 78° 4' W.; length from N. to S. 6 m., breadth from E. to W. 2 m. The surface is varied, now low and undulating, now swelling into mountains, one of which is 2,000 ft. above the sea. The lower portions are covered with a thick forest growth. The soil is very fertile. There are few inhabitants. It is chiefly remarkable as having been visited by Pizarro immediately prior to the conquest of Peru, and having long been a favorite resort of buccaneers.

GORGONS, in Greek mythology, three sisters, daughters of Phoreys and Ceto, who had but one eye in common, and changed into stone whomsoever they looked upon. Homer mentions but one gorgon, which appears as a hideous phantom in Hades, and whose head, of frightful aspect, was represented on the ægis of Athena. Hesiod mentions three, Stheno, Euryale, and Medusa, who had hissing serpents for hair, brazen claws, short wings, and a single tusk-like tooth. They were placed in the garden of the Hesperides near the realm of Night, where Medusa was slain by Perseus. Virgil places the gorgons with harpies and other monsters at Pluto's palace gate.

GORILLA, the largest of the anthropoid apes, a native of the equatorial region of western Africa, and first introduced to the scientific world by Dr. T. S. Savage in 1847. There were vague reports by voyagers and travellers of the existence in Africa of a quadrumanous animal larger than the chimpanzee, and there were in museums portions of a creature since ascertained to be the gorilla; but naturalists

had their attention first called to it by the paper of Dr. Savage in vol. v. of the "Boston Journal of Natural History," in which he described the external characters and habits, and Prof. Jeffries Wyman described four crania and several parts of the skeleton. Dr. Savage described it as *troglodytes gorilla*; Prof. Owen called it *T. Savagei*, retaining it in the same genus with the chimpanzee; Geoffroy Saint-Hilaire established for it the genus *gorilla* in 1852, and in 1853 gave it the name of *G. gina*, which is the best known, though *G. Savagei* has a prior claim. The common names of the gorilla among the natives of the region where it is found are *engeena*, *geena*, and *engeela*. There are specimens of the animal, more or less complete, in the collections at Philadelphia, Boston, London, and Paris; and Du Chaillu, on his return to the United States in August, 1859, from the country about the Gaboon river, brought with him several complete specimens,



Gorilla.

male and female, both skins and skeletons, in excellent preservation, most of which are now in the London collections. Du Chaillu is the first white man who killed a gorilla with his own hand, or who had an opportunity of studying its habits in its native forests.—The skull of the male is longer and wider, but less heavy, than that of man, and the capacity of the cavity which contains the brain is less than one half of that of the most degraded human races. The most striking peculiarity is the great development of the interparietal and occipital crests and the ridges over the orbits, which give an angular outline to the skull, resembling the oranges in the first and the chimpanzee in the latter character; there is a great thickness of the orbital walls, with much space between the orbits, and a prominence on the inner wall directed outward; a noteworthy character is the coalescence of the nasal bones above, with a median suture on their lower half, the upper

portion ascending above the nasal processes of the superior maxillary and becoming contracted between them, slightly projecting as in man; the crests are much less in the female. The cranial crests, wide zygomatic arches, and massive lower jaw give indication of the powerful muscles. The dental formula is the same as in man and the higher quadrumana; the canines are enormous, the incisors very wide, the lateral ones being more pointed, and the lower molars have five tubercles instead of four. The bones of the trunk and extremities are remarkable for their size and strength; the length of the cervical spines is such that the nape is more prominent than the back of the head; the scapulæ and bones of the arm indicate the attachment of muscles in comparison with which man's seem like those of a child. The expression of the face is scowling; the nose is very flat and widely open; the ears are small; the eyes are much sunk in the head, and the lashes are short and thick; the mouth is very wide, the lips large and thin, the lower one pendulous and very movable, the chin short and receding, and the whole muzzle prominent; the face is transversely wrinkled and black. The chest is capacious, the shoulders very wide, and the abdomen everywhere projecting. The limbs are greatly developed and of immense strength; the arms are longer than in the chimpanzee, reaching far down the leg, but according to Owen, whose observations are generally confirmed by the specimens of Du Chaillu, the arms do not extend so low as the knee; while the arm and forearm are longer than in the chimpanzee, the hand is shorter, wider, and more human in its carpal and metacarpal portions and the lateral position of the thumb; from the length of the palm the fingers appear short and thick as if swollen; they are also less free, as the posterior portion of the three intermediate fingers is covered by the undivided integument. There is very little appearance of wrist, the circumference at this part being twice that of a strong man's; the fingers taper to a point, are not arched, and the nails are flat and relatively small; the fingers are about twice the circumference of man's, and the skin of the middle joint is callous from the habit of the animal of applying these surfaces to the ground when it adopts a favorite way of progression by swinging its body forward supported by and between the hands; the thumb is short, and not more than half the size of the fore finger. The posterior extremities are occasionally used alone in standing and in progression; the thigh is relatively short, and of a nearly uniform size, in its middle portion not surpassing in circumference the same part in man; the leg increases in thickness from below the knee to the ankle; the tendinous portion of the muscles is developed more than the fleshy, with a great gain in strength. The foot is longer than the hand, and is human-like also in having the three intermediate toes

about the same length, and partly united at their base by the integuments; the gorilla is essentially quadrumanous, and the posterior thumbs are largely developed, widely separated from the toes, to which they are easily opposed, and well calculated for prehension. The genus *gorilla* was established by Geoffroy Saint-Hilaire on the following characters principally: the head rounded in the young, very much elongated and depressed in the adult, with very prominent crapial crests; the peculiar conformation of the organs of sense, above detailed; the gigantic size; the proportions of the limbs, and the characters of the hands and feet; and the peculiarities of the teeth. It seems sufficiently distinct from *trogodytes niger*. It is not easy to determine the precise position of the gorilla in the quadrumanous series; in the structure of the hand and foot it comes nearer to man than the chimpanzee does; in the canines it would seem to be below even the orangs; and in the proportion of the arm and forearm it is below the chimpanzee. The very indefiniteness of its position is another argument for its separation as a genus among the quadrumana. The adult male gorilla is from 5 to 6 ft. high in its natural altitude, though after death it may be stretched beyond this; most specimens are under 6 ft., on account of the relative shortness and generally flexed position of the legs; it far surpasses man in the dimensions of the head, neck, body, and arms, and in the width of the shoulders; some are said to measure from 7 to 9 ft. from the end of one outstretched hand to that of the other; one of Du Chaillu's specimens measures 8 ft. 11 in. The general color of the hair, which is coarse and about 2 in. long on the arms, an inch on the belly, and quite short on the back and legs, is gray inclining to black. There is a black stripe about $2\frac{1}{2}$ in. wide extending diagonally down the sides from behind the shoulder to the belly, which is entirely black. On the upper portion of the back the hair is very thin; old ones are bare in that part. On the arms the hair is black, and reversed from the wrist to the elbow; the chest is nearly bare; there are a few white hairs in the anal region; the face, hands, and feet are black; the hands are hairy as far as the division of the fingers, the palms naked and callous; the head has generally a reddish tint; on the whole the male would be called grayish and the female blackish. The young differ greatly from the adults in the shape of the head, and the females are less ferocious-looking as well as much smaller than the males.—The gorilla is found on the W. coast of Africa, both N. and S. of the equator, but especially in the wooded districts of the interior near the head waters of the Gaboon river, and along the Muni river as far E. as the Crystal mountains. It is principally an inhabitant of the woods, but though the structure of its four hands seems well adapted to climbing on trees, it is very rare that a female

or a young male is seen on them—the old males never; its favorite mode of progression is on all fours, in a shuffling manner and rolling from side to side, but with its head always erect and its face looking forward; on account of the greater length of the arms it stoops less than the chimpanzee, and is fond of thrusting these forward, with the flexed fingers on the ground, and of giving its body a half jumping, half swinging motion forward between them; when it assumes the erect posture, it flexes the arms upward or crosses them on the nape in order to counterbalance the tendency of the trunk to fall forward. Gorillas are generally seen in troops of five, four females and one male, but the old males are occasionally met wandering alone; though living in the same neighborhood as the chimpanzees, they do not associate with them. Their strength is enormous, not only in the jaws, which are able to crush the barrel of a musket, but in the hands and feet, which they use in common with their canines in attack and defence; they are able to break with ease trees three or four inches in diameter. The males are exceedingly ferocious, generally attacking man and animals intruding upon their haunts; if wounded, they are more terrible than the lion, and in this event the hunter's death is sure and speedy if his hand trembles or his gun misses fire. They approach the enemy standing, advancing a few steps at a time, pausing to beat their breasts with both hands, and roaring terribly. When near enough, they spring upon him, and destroy him with their powerful hands. One of Du Chaillu's men was eviscerated by a single blow. The story of their carrying clubs is untrue. They are perfectly untamable, in this respect differing from the chimpanzee, which, in youth at least, appreciates kind treatment. When living in troops they are shy and difficult to approach, but when mated or alone they almost invariably offer battle, and are then the most terrible of animals. When living near villages, they sometimes come at day-break to eat the plantains and sugar cane of the natives; besides these they eat nuts, berries, fruits of the oil palm and banana, the acid pulp of the *amomum*, the white portions of the leaves of the pineapple, and roots. Unlike the chimpanzee, the gorilla makes no shelter for itself. In intelligence it is considerably inferior to the chimpanzee. It exhibits great fondness for its young, of which it has one at a time. The reports of its visiting villages and carrying off negroes into the woods are mere fables. It is generally mute, but sometimes amuses itself by a sort of roaring, which, beginning low, increases till the forest echoes with its reverberations. When about to attack its enemies it gives a terrific yell, which resounds far and wide. The negroes of the interior are very fond of eating the flesh of gorillas as well as of chimpanzees and monkeys. Among the coast tribes, on the other hand, it is considered an abomination to eat the flesh

of either the gorilla or the chimpanzee, on account of their resemblance to man.

GORITZ. See GÖRZ.

GORKHAS, the dominant people of Nepal in India. Little is known of their history until about 1768, when, having consolidated or conquered the petty independent tribes among whom Nepal was parcelled out, they found themselves masters of the whole of that country, and eventually of almost the entire alpine region, as it is called, of northern India. Having invaded Thibet in 1790, they were defeated by the Chinese, to whom the lamas had applied for assistance, and during a short period they remained in nominal subjection to the celestial empire; but in 1792 their independence was recognized by a commercial treaty with the East India company. A few years later they were involved in a war with the British. (See NEPAUL.) The Gorkhas are of Mongol origin, but smaller and darker than the Chinese. They are seldom over 5 ft. high, are hardy and active, and make good soldiers. They form a valuable portion of the native troops enlisted in the British army, and won the enthusiastic praise of the English officers by their uniform fidelity during the sepoy revolt of 1857-'8, and their services in the field, particularly during the Delhi campaign. They are Hindoos in religion, but unlike Hindoos in appearance, customs, and freedom from caste prejudice.

GORKUM, or **Goreum** (Dutch, *Gorinchem*), a fortified town of the Netherlands, province of South Holland, on the right bank of the Maas, 22 m. S. E. of Rotterdam; pop. about 10,000. It has a college, a scientific society, the ancient church of St. Vincent containing the tombs of the lords of Arkel, and the town hall adorned with remarkable paintings. It has a considerable trade in corn, hemp, butter, cheese, salmon, and Frisian horses; there are also yards for boat building, and extensive rope walks. A canal from Gorkum to Vianen unites the Leek with the Maas. Gorkum acquired importance in the 14th century, was considered the key of Holland at the beginning of the French revolution, and was ruined by an inundation in 1809. —The martyrs of Gorkum is the name given in the Roman Martyrology to 19 persons (17 priests regular and secular, and two Franciscan lay brothers) put to death by William de la Marck and his *gueux de la mer* in 1572. They were beatified by Pope Clement X. Nov. 24, 1673, and their feast is held on July 9, the anniversary of their death.

GÖRLITZ, a town of Prussian Silesia, situated on an eminence which overhangs the left bank of the Neisse, and on the Dresden and Breslau railway, 53 m. E. of Dresden; pop. in 1871, 42,224. It consists of the inner town, which is surrounded with walls having 11 gates, and the suburbs. The Gothic Protestant church of Sts. Peter and Paul has a famous organ. A fine Gothic building was erected for the gymnasium in 1856. The town is the seat of several scientific and literary societies. The town hall con-

tains a large library. The manufactures are linen and woollen cloth, tobacco, starch, &c. Görlitz was a city of great importance in the three centuries preceding the reformation, and the capital of Upper Lusatia; it then declined, but of late the population has rapidly increased in consequence of the flourishing industry.

GÖRRES. I. **Jakob Joseph von**, a German author, born in Coblenz, Jan. 25, 1776, died in Munich, Jan. 29, 1848. After the proclamation of the French republic he gave up the study of medicine to devote himself to politics. His ardent republicanism showed itself in his first writings, and caused the suppression of a periodical published by him. In 1799 he went to Paris at the head of a deputation sent by the German provinces on the left bank of the Rhine to prepare the way for a complete union with France. Bonaparte, just raised to power by the *coup d'état* of the 18th Brumaire, could not find time to confer with the German deputation, and Görres returned home with his republican hopes much weakened. After his return he was appointed professor of natural sciences in the college of Coblenz, and he soon afterward published several philosophical works, all pervaded with the prevalent idealism. In 1803 he lectured in the university of Heidelberg, where he resided till 1808, publishing *Die deutschen Volksbücher*, and editing the *Einsiedlerzeitung*. Returning to Coblenz, he published several works on Asiatic mythology and German mediæval literature. In 1814, after the fall of Napoleon, he established *Der Rheinische Mercur*, which advocated the restoration of the German empire; it was suppressed by the Prussian government in 1816. In 1820 appeared his *Deutschland und die Revolution*, warning sovereigns that a new revolution was inevitable unless God and the Catholic church were made supreme in the restored political state. In 1827, after having resided in France and Switzerland, he was appointed professor of history in the university of Munich. The difficulty which arose in 1837 between the archbishop of Cologne and the Prussian government induced him to write his *Athanasius*, in which he espoused the cause of the archbishop, and which had great influence on the Catholics of Germany. This he followed up by other writings, and he founded the periodical *Historisch-politische Blätter*, which took a leading part in Catholic literature. In 1844 he once more advocated the political union of Germany. In 1845 he was elected a member of the Munich academy of science; and he published about that time treatises on ethnology regarded as fragments of a comprehensive universal history, which he did not live to complete. His principal work is *Christliche Mystik* (4 vols., Ratibon, 1836-'42). A complete edition of his works, edited by his daughter, has been published (8 vols., Munich, 1856-'60). A sketch of his life was published by his pupil Sepp in 1848. II. **Guido**, a German author, son of the preceding, born in Coblenz, May

23, 1805, died July 14, 1852. After the death of his father he edited the *Historisch-politische Blätter*, but is chiefly known by his poems, legendary writings, and juvenile books. Among these are: *Die Jungfrau von Orleans* (1834); *Schön Röslein* (1838); *Testkalender in Bildern und Liedern* (3 vols., 1835-'9); *Marienlieder* (1842); *Der hürnene Siegfried und sein Kampf mit dem Drachen*, illustrated by Kaulbach (1843); *Die Gottesfahrt nach Trier und des Teufels Landsturm* (1844); and *Die arme Pilgerin zum heilige Rocke* (1846).

GORTCHAKOFF, a Russian princely family, descended from the royal house of Rurik, several members of which have distinguished themselves. **I. Petr**, commander of Smolensk, is celebrated for his defence of that place against the army of Sigismund III., king of Poland, from 1609 to 1611, when it was taken by assault. **II. Dmitri**, born in 1756, won a place among the poets of Russia by his odes, satires, and epistles, and died in 1824. **III. Alexander**, born in 1764, served under Suvaroff against the Turks, the Poles under Kosciuszko, and the French in the campaign of Switzerland, and subsequently with great distinction under Benningsen in the campaign of 1807, when he defeated Lannes at Heilsberg and fought at Friedland, acted as chief of the war ministry in 1812, was appointed general of infantry, and died in 1825. **IV. Andrei** served as major general under Suvaroff in 1799, and commanded a division during the French invasion in 1812, when he distinguished himself in the battle of Borodino; he left the army in 1828, and died in 1855. **V. Alexander**, a statesman, born July 16, 1798. He acquired experience in diplomacy under Nesselrode in various employments, and in 1824 he was appointed secretary of legation in London; in 1830 chargé d'affaires in Florence; and in 1832 councillor of the embassy at Vienna, where he often acted as ambassador during the illness or absence of his chief. In 1841 he was sent to Stuttgart, and having negotiated the marriage between the crown prince (now king) of Würtemberg and the Russian grand duchess Olga, he was in 1846 made privy councillor. In 1850 he was appointed plenipotentiary to the German diet at Frankfort, and in 1854 he succeeded Meyendorff as ambassador in Vienna. He displayed consummate tact and ability during the Crimean war, and it was mainly through his influence that the treaty of Paris was signed by Russia (March, 1856); after which he succeeded Nesselrode as minister of foreign affairs. In 1857 he attended the emperor Alexander during his interview with Napoleon III. in Stuttgart. As the policy of France became hostile to Austria on the Italian question, he increased in friendliness toward the former. Ambitious above all to restore the prestige of Russia after the calamities of the Crimean war, he addressed in 1860 a circular despatch to the European powers appealing to the same principle of nationalities in the Two

Sicilies which Russia had always upheld in regard to the Christians of the East, and remonstrated against any foreign interference in Neapolitan affairs; at the same time disclaiming any idea of revenge for past defeats. He favored the French expedition of 1861 to Syria for the protection of the Christian population against renewed massacres; but preserving entire independence in his foreign policy, he refused to associate himself with France and Great Britain in their unfriendly attitude toward the United States after the outbreak of the civil war. During the Polish insurrection of 1863 he availed himself of the opportunity presented by the interference of foreign powers in behalf of the Poles, to vindicate the aversion of Russia to foreign dictation, and her determination to settle her internal affairs in accordance with the interests and the integrity of the empire, and without regard to the views of other nations. This course increased his popularity at home and his prestige abroad, and the emperor, who had assigned to him the title of vice chancellor in 1862, now (July, 1863) promoted him to the office of chancellor. In 1866 he succeeded in securing the complete separation of the Roman Catholic clergy of Poland from the holy see. His most brilliant achievement was begun in October, 1870, when, after an understanding with Bismarck on the subject, he availed himself of the Franco-German war to undo the injury done to Russian influence in the East by the treaty of Paris, by securing at the London conference of January, 1871, the revision of that treaty, and the formation of another (March 13) putting an end to the neutralization of the Black sea; for this the emperor conferred upon him the dignity of serene highness. In the central Asia question (1873-'4) he exhibited a desire to avoid disturbing the friendly relations with England, without, however, receding from an aggressive policy. Though suffering from the gout, he continued (1874) to preside over the chancery, but generally spends the summer in Switzerland or Germany for the benefit of his health. His eldest son, **MIKHAIL**, was appointed Russian minister at Bern in 1872. **VI. Petr**, a general, born in Moscow about 1790, died there in 1868. He entered the army at an early age, fought against Napoleon in the campaigns of 1807 and 1812-'14, served under Yermoloff in the Caucasus, and distinguished himself in the war against Turkey in 1828 and 1829, when he signed the peace of Adrianople. He was made governor general of western Siberia in 1839, and general of infantry in 1843, and retired from service in 1851; but reentered it on the breaking out of the Crimean war, and commanded a wing of the Russian army at the Alma and at Inkerman in 1854. He resigned in the spring of 1855, and was in 1858 appointed member of the imperial council. **VII. Mikhail**, born in 1795, died May 30, 1861. He served against the French in the campaigns of 1807 and 1812-'14, against the Swedes in 1808-'9,

and against the Turks in 1828-'9, when he led the sieges of Shumla and Silistria, distinguished himself in the war of the Polish revolution (1831) at Grochow, Ostrolenka, and the taking of Warsaw, was made general of artillery, and in 1846 military governor of Warsaw, where he subsequently often acted as lieutenant of Prince Paskevitch, whom he also accompanied on the invasion of Hungary in 1849. In 1853 he received the command of the army of invasion sent to the Danubian principalities, ceded it soon after to Paskevitch, but took it again after the raising of the siege of Silistria, and led the retreating army to Bessarabia. In 1855 he was appointed commander-in-chief in the Crimea and southern Russia, and suffered defeat on the Tchernaya, but greatly distinguished himself by the gallant defence of Sebastopol, as well as by the skilful retreat to the North fort after the fall of the fortress. In 1856, after the death of Paskevitch, he was appointed governor of Poland by Alexander II., and he was carrying out that emperor's conciliatory measures at the time of his death.

GORTON, Samuel, a New England religious enthusiast, the first settler of Warwick, R. I., born in Gorton, England, about 1600, died in Rhode Island in November or December, 1677. He did business in London as a clothier till 1636, when he embarked for New England, and settled at Boston, and afterward at Plymouth, where he began to preach such peculiar doctrines that he was banished from the colony on a charge of heresy. With a few followers he went to Rhode Island, which had recently been settled by exiles from Massachusetts Bay; but falling again into trouble, he was publicly whipped for calling the justices "just asses" and for other contemptuous acts, and was forced to seek an asylum with Roger Williams in Providence, about 1641. Here he made himself so obnoxious that in November of that year a petition was addressed to the authorities of Massachusetts praying that Gorton and his company might be "brought to satisfaction." That colony having acquired a nominal jurisdiction over Pawtuxet, where Gorton had settled, he was summoned to Boston in September, 1642; but he refused to recognize the jurisdiction thus assumed, and about the same time removed to Shawomet, on the W. side of Narragansett bay, where he purchased land from the sachem Miantonomo. But in June, 1643, two inferior sachems contested his claims to the land, and applied to the general court at Boston for assistance. A body of 40 soldiers was consequently marched to Shawomet, and Gorton and ten of his disciples were carried to Boston, where, the question of the land being laid aside, they were put on trial for their lives as "damnable heretics." Gorton and six others were found guilty, and sentenced to confinement and hard labor in irons. In March, 1644, they were released, and ordered to leave the colony within 14 days. Gorton then went to England to obtain re-

dress, and having procured a letter of safe conduct from the earl of Warwick to the Massachusetts magistrates, and an order that his people should be allowed peaceable possession of their lands at Shawomet, he returned in 1648 to his colony, which he named after the earl. Though Massachusetts did not relinquish her claim over the Shawomet settlement until some years later, Gorton's remaining years seem to have passed quietly. He discharged many important civil offices, and on Sundays used to preach to the colonists and Indians. It is difficult to determine what were his religious opinions. He contemned a clergy and all outward forms, and held that by union with Christ believers partook of the perfection of God, that Christ is both human and divine, and that heaven and hell have no existence save in the mind. He published "Simplicities Defence against seven-headed Policy," a vindication of his course in New England (4to, London, 1646; reprinted in the collections of the Rhode Island historical society); "An Incorruptible Key composed of the CX. Psalme" (1647); "Saltmarsh returned from the Dead" (1655); "An Antidote against the common Plague of the World" (1657); "Certain Copies of Letters," &c. He also left in manuscript a commentary on a part of the Gospel of St. Matthew.—See his life by J. M. Mackie in Sparks's "American Biography."

GORTYNA, an ancient town of Crete, a little S. of the centre of the island, on a plain watered by the Lethæus. It was 90 stadia from the Libyan sea, on which it had two ports, Lebena and Metallum. It was next in importance and splendor to Cnossus, in alliance with which it early reduced all the rest of the island to subjection; but it was afterward at war with Cnossus, and also with Cydonia, against which Philopomen commanded its forces for several years. The site of Gortyna is thought to be near the modern Hagios Dheka. The caverns in the neighborhood have been described by Savary and Tournefort, and Captain Spratt sees in them the labyrinth of Minos.

GÖRTZ, Georg Heinrich, baron, a Swedish statesman, born in Germany, executed in Stockholm in March, 1719. He belonged to an ancient family, whose original name was Schlitz. He became minister of Holstein, and was sent in 1706 on a mission to Charles XII., who made him his minister of finance and afterward prime minister. In both positions he evinced rare abilities, as well as great unconcern in the choice of his means. He was endeavoring to restore the fallen fortunes of Sweden by an extraordinary diplomatic combination (see CHARLES XII.) when the king was killed at the siege of Frederikshald (1718), and he was arrested and sentenced to the block by Ulrica Eleonora and her husband Frederick of Hesse, who succeeded to the Swedish throne. The pretext for his execution was that he had mismanaged the finances and goaded on Charles to fatal enterprises.

GORUCKPOOR. I. A district of the Northwest Provinces, British India, bounded N. by Nepal, W. and S. W. by Oude; area, 7,346 sq. m.; pop. in 1871, 2,044,281. The surface is generally level, but broken in the E. and S. E. parts by ridges of low steep hills. The principal rivers are the Gogra, Gunduk, and Raptee, which have a S. E. course. The district also abounds in shallow lakes. The soil is rendered fertile by careful irrigation. The inhabitants are poor, and agriculture is almost the only branch of industry. The district was ceded to the British in 1801 by the vizier of Oude, in commutation of subsidy. II. The principal town of the district, on the left bank of the Raptee, here crossed by a ferry 600 ft. long, 104 m. N. by E. of Benares and 430 m. N. W. of Calcutta; pop. about 40,000. It is surrounded by forests and plantations, and during the rainy season is often encompassed by water.

GÖRZ, or Goritz. I. A circle of Cisleithan Austria (generally called Görz and Gradisca), forming with Istria and Trieste the Littoral province, but having its own diet; area, 1,143 sq. m.; pop. about 200,000, of whom 66 per cent. are Slovenes, 25 per cent. Friulians, 7 per cent. Italians, and the remainder Germans. In the middle ages the district belonged to the counts of Tyrol; it was united with the possessions of the house of Austria by Maximilian I., about 1500. II. The capital of the circle, on the Isonzo, 22 m. N. N. W. of Trieste; pop. in 1869, 16,823. It consists of two parts, the upper or old town, and the lower or new town. The upper is fortified and contains the castle of the former counts of Tyrol and Görz. It is the seat of an archbishop and of a central episcopal seminary for all the dioceses of the Littorale, and has a deaf and dumb institute and a chamber of commerce and industry. The principal manufactures are leather, sugar, and silk. Charles X., the exiled king of France, died here in 1836, and his son the duke of Angoulême in 1844.

GÖSCHEN, George Joachim, an English statesman, born in London in 1831. His father, who died in 1866, was a German merchant doing business in London. The son was educated at Rugby and afterward at Oriel college, Oxford, but did not graduate on account of his scruples against taking certain prescribed oaths. In 1853 he became a partner in his father's commercial house, and gave special attention to financial questions. In 1863 he published "The Theory of Foreign Exchanges," which is regarded as a standard work. In the same year he was returned to parliament for the city of London, and took a prominent part in the movement for the abolition of religious tests and for throwing the universities open to dissenters. In July, 1865, under the Palmerston ministry, he was made vice president of the board of control, in November, under Russell, a member of the privy council, and in January, 1866, chancellor of the duchy of Lan-

caster. In June, with the other members of the ministry, he retired from office. On the accession of the Gladstone ministry in December, 1868, he entered the cabinet as president of the poor-law board, and in March, 1871, was made first lord of the admiralty. He resigned with the other ministers in February, 1874.

GOSHAWK, a bird of prey of the family *falconidae*, subfamily *accipitrinae*, and genus *astur* (Lacép.). The bill is short, broad at the base, with the culmen elevated and arched; the tip acute, with the lateral margins festooned in the middle; the nostrils large and in the basal cere; wings reaching to the middle of the tail, the third, fourth, and fifth quills nearly equal and longest; the tail long and broad; tarsi rather longer than middle toe, covered with broad transverse scales in front and behind; toes long, strong, and well padded below; claws strong, long, and curved. Gray describes 13 species, which are found throughout the world. The form is rather long and slender, the wings comparatively short, and the legs and tail long; they fly very swiftly and strongly, and always strike their prey while on the wing; they lurk about poultry yards, seize a duck or a chicken, and are out of shot before the farmer is aware of his loss; they also prey upon wild ducks, grouse, pigeons, hares, rabbits, squirrels, and other animals of this size; they build their nests on lofty trees, and lay from two to four eggs. The only species in the United States is the American goshawk (*A. atricapillus*, Wils.), found all over North America, but most abundant in the north and northwest. The adult female is about 2 ft. long, with an extent of wings of 4 ft. and a weight of about 3 lbs.; the male is smaller; both sexes



American Goshawk (*Astur atricapillus*).

are alike in plumage. In the adult the general color of the upper parts is dark ash-gray, the shafts and sometimes the edges of the feathers black; head above and neck behind black with a grayish tinge; a broad line of white over each eye; under parts grayish white,

sides and abdomen tinged with brown; blackish brown longitudinal streaks on the fore neck, and transverse blackish gray lines on the breast, sides, and belly; quills brown, ashy on their inner webs; tail with four or five broad brownish black bands, and narrowly tipped with white. The young birds are dark brown above, with light markings; the tail ashy; the under parts white, with yellowish red tinges, each feather with a longitudinal stripe ending in a brown ovate spot. This is one of the boldest and most rapid of the genus, and follows with untiring wing the flocks of wild pigeons and ducks; it seldom alights unless to devour its prey, and when thus engaged stands very erect. The nest is of large size, flat, and made of coarse materials; the eggs are of a bluish white color, sometimes with light brownish spots.—The European goshawk resembles the American, but the transverse bands on the under surface are much more regular. It equals the gerfalcon in size, but not in strength and courage; though an ignoble bird, and falling obliquely on its prey, it is used in falconry for the weaker and ground game, such as hares and rabbits, or birds of low flight like grouse and ducks.

GOSHEN, in Biblical geography, the district of Egypt in which Jacob and his family settled, and where his descendants remained till their deliverance by Moses. The locality is generally fixed in Lower Egypt, E. of the Pelusiac branch of the Nile.

GOSHEN, a town and village, one of the county seats of Orange co., New York, on the Erie railway, at the junction of two branches, 48 m. N. N. W. of New York; pop. of the town in 1870, 3,903; of the village, 2,205. It is celebrated for its excellent butter, which is made chiefly for the New York market. The village contains a female seminary, several classical schools, two national banks, and two weekly newspapers.

GOSLAR, a town of Hanover, Prussia, 26 m. S. E. of Hildesheim, on the Gose, at the base of the Rammelsberg; pop. in 1871, 8,923. Its most important public edifices are the town house, which was erected in the 15th century, the imperial palace, now in part a ruin, and the Gothic church, whose library contains a considerable number of Luther's manuscripts. In the vicinity are slate quarries, from which N. Germany is supplied with that material. The inhabitants are chiefly engaged in mining and quarrying. It was founded about 920, was the residence of several German emperors, and was a free imperial city till 1801.

GOSNOLD, Bartholomew, an English voyager, died in Virginia, Aug. 22, 1607. He joined Raleigh in his attempt to colonize Virginia, and after the failure of that enterprise was placed in command of an expedition fitted out for planting a settlement in New England. He sailed from Falmouth, March 26, 1602, with one small vessel and a company of 32 persons, 20 of whom were colonists. Instead of follow-

ing the usual route by the Canaries and West Indies, he steered directly across the Atlantic, and in seven weeks reached Massachusetts bay, first seeing land probably not far N. of Nahant. Thence he turned S., and landed on Cape Cod, to which he gave the name it still bears. Sailing around the promontory, and stopping at the island now known as No Man's Land, but which he called Martha's Vineyard, Gosnold anchored at the mouth of Buzzard's bay, and resolved to plant his colony on an island which he called Elizabeth (now known by its Indian name of Cuttyhunk). The adventurers here built and fortified a house, but the hostility of the Indians, scarcity of provisions, and disputes about a division of the profits, disheartened them, and the whole party returned to England, accomplishing the voyage in five weeks, and taking a cargo of sassafras root, cedar, furs, and other commodities. The result of the expedition was such as to encourage many others to follow the same short route across the ocean, and pursue the explorations which Gosnold had begun. Gosnold next turned his eyes toward Virginia, and succeeded in organizing a company for colonization in that region, the heads of which were Edward Wingfield, a merchant, Robert Hunt, a clergyman, and Capt. John Smith. A charter was granted them by James I., April 10, 1606, which was the first instrument of that nature under which the English were planted in America; and on Dec. 19, 1606, Gosnold set sail with three small vessels and an ill-assorted band of 105 adventurers. After a tedious voyage, a storm having driven them into Chesapeake bay (April 26, 1607), they sailed up James river, which they named after the king, disembarked about 50 m. above its mouth, and founded the settlement of Jamestown. Sickness and various disasters destroyed 50 of their number before autumn, among whom was Gosnold.

GOSPEL (Sax. *godspell*, corresponding to the Gr. *εὐαγγέλιον*, a joyful message), either the whole system of the doctrines of Christ, or one of the four histories of his life and teachings written by Matthew, Mark, Luke, and John. The extant spurious gospels, forming a part of the apocrypha of the New Testament, are the "History of Joseph the Carpenter," the "Gospel of the Infancy," the "Gospel of Thomas the Israelite," the "Protevangelion" of James, the "Gospel of the Nativity of Mary," and the "Gospel of Nicodemus, or Acts of Pilate." Many others, not extant, are mentioned by the church fathers. (See APOCRYPHA.)

GOSPORT, a seaport town of Hampshire, England, opposite Portsmouth, on the W. side of the entrance to the harbor of the latter; pop. in 1871, 7,366. It is situated on level ground and surrounded by fortifications, which form part of those of Portsmouth and Portsea. It contains two churches and four chapels for Protestants and one for Roman Catholics. The most conspicuous establishment is the royal Clarence victualling yard for supplying vessels.

GOSSE, Philip Henry, an English zoologist, born in Worcester, April 6, 1810. He went to Newfoundland in 1827 in a mercantile capacity, and during a residence there of eight years occupied his leisure in collecting insects and making colored drawings of them. He removed to Lower Canada, where he pursued his studies of zoology, particularly entomology, for three years, and afterward travelled in the United States, making in Alabama numerous drawings of the *lepidoptera* of that region, and wrote "Letters from Alabama, chiefly relating to Natural History." After his return to England in 1839, he published the results of his observations under the title of the "Canadian Naturalist" (London, 1840). In 1844 he visited Jamaica to study its zoology, and on returning after 18 months published "The Birds of Jamaica," which was followed by an "Atlas of Illustrations" and "A Naturalist's Sojourn in Jamaica." During the subsequent years he published an "Introduction to Zoology," and prepared many works for the society for the promotion of Christian knowledge. He then devoted himself especially to the microscopic study of the British *rotifera*, and took a prominent part in the formation of public and private collections of marine animals. In 1856 he was elected a member of the royal society. His remaining works include: "The Aquarium" (1854); "Manual of Marine Zoology" (1855); "Tenby, a Seaside Romance" (1856); "Life in its Lower, Intermediate, and Higher Forms" (1857); "Omphalos, an Attempt to Untie the Gordian Knot" (1857); "Evenings at the Microscope" (1859); "Actinologia Britannica, a History of the British Sea Anemones and Corals" (1860); "The Romance of Natural History" (1860-62); "A Year at the Shore" (1865); and "Land and Sea" (1865).

GOSSELIES, a market town of Belgium, in the province of Hainaut, on the Brussels and Charleroi railway, 23 m. S. by E. of Brussels; pop. in 1866, 6,511. It has important manufactures of woollens, hats, steel ware, and leather, and near it are large coal mines. The battle fought near this place June 26, 1794, between the French and the Austrians, is known as the battle of Fleurus.

GOTHA. **I.** Formerly an independent duchy (Saxe-Gotha), but now politically united with Coburg under the name of Saxe-Coburg-Gotha; pop. of Gotha in 1871, 122,630. (See **SAXE-COBURG-GOTHA**.) **II.** The capital, and alter-

nately with Coburg the residence of the duke; pop. in 1871, 20,591. It is the principal station of the Thuringian railway, by which the distance to Halle is 83 m. and to Weimar 30 m. The palace of Friedenstein adjoins the town, and contains collections of fine arts and one of the richest collections of coins in Europe; also a library with upward of 200,000 volumes



The Ducal Palace, Gotha.

and more than 6,000 manuscripts, among which are 14 folio volumes of St. Bernard's correspondence and about 3,000 Arabic and Persian manuscripts. Gotha has a famous gymnasium, many excellent educational and charitable institutions, and an observatory established in 1859 by Hansen. It is one of the most prosperous trading and manufacturing places of Thuringia. It is the seat of a celebrated fire and life insurance company, and of the geographical establishment of Justus Perthes, the publisher of the *Almanach de Gotha*.

GOTHAM, a parish of Nottinghamshire, England, the Beotian rusticity of whose inhabitants gained them the proverbial appellation of "the wise men of Gotham." The name Gotham was satirically applied by Washington Irving to the city of New York.

GOTHENBURG, or **Gottenburg** (Swed. *Göteborg*).

I. A län or province of Sweden, in the S. W. part of the kingdom, bordering on the Cattegat, the Skager Rack, and Norway; area, 1,890 sq. m.; pop. in 1873, 236,899. It forms a narrow strip of land between the mountains which separate it on the east from the province of Elfsborg and the rugged coast, which is indented by numerous bays and bordered by many small islands. The climate is severe; the soil is sterile, and there are few manufactures except in the capital city. **II.** The capital of the province, and the second commercial city of Sweden, at the head of a fiord on the Cattegat at the mouth of the Götha river, 240 m. W. S. W. of Stockholm; pop. in 1873, 59,329.

It has a good harbor, with 17 ft. of water, enclosed by two long ridges of rock about $1\frac{1}{2}$ m. apart. There is anchorage for vessels of large size, but only the smaller craft can come up to the shore. The city is intersected by navigable canals, and as it occupies marshy ground, the houses of the lower town are generally built on piles. The upper town stands on adjacent rocky heights. The houses are mostly of stone or stuccoed brick, with terraced roofs. The

principal public edifices are the cathedral, the Swedish church, the new exchange, the arsenal, the town hall, the theatre, and the East India house. The manufactures comprise cottons, woollens, sail cloth, tobacco, snuff, glass, paper, leather, refined sugar, and porter. Most of the merchants are Scotch and English. In 1872 the entries at the port were 2,161 vessels, of 598,487 tons; the clearances 1,800 vessels, of 548,545 tons. The city was founded by Gus-



Gothenburg.

tavus Adolphus in 1618, and was once well fortified. It has had frequent fires.

GOTHIC LANGUAGE AND LITERATURE. The Gothic language became extinct with that Germanic race by whom it was spoken. The existing Gothic manuscripts are written in characters related in form and order to the Greek alphabet, and, it is said, invented by Bishop Ulfilas. The order of the alphabet has been ascertained from the numerical values attached to the letters. It is not customary in modern books to make use of Ulfilas's characters. The original form, order, and numerical value of the Gothic alphabet, and the way in which it is usually transcribed, are as follows:

FORM.	NUM.	VALUE.	TRANSC.	FORM.	NUM.	VALUE.	TRANSC.
Ἀ	1	a		Ḡ	60	j	
Β	2	b		Ḣ	70	u	
Γ	3	g		Π	80	p	
Δ	4	d		Υ	90	—	
Ε	5	ê		ᚷ	100	r	
U	6	kv (q)		ᚺ	200	s	
Ζ	7	z		ᚹ	300	t	
Η	8	h		Υ	400	v (w)	
Φ	9	th (þ)		ᚦ	500	f	
Ι	10	i		Χ	600	z (ch)	
Κ	20	k		Θ	700	hv	
Λ	30	l		Ω	800	ð	
Ἰ	40	m		ᚠ	900	—	
Ἠ	50	n					

The transcription of several letters is not uniform. Some write, instead of *kv*, *qu*; for *v*, the German *w*; and instead of the aspirated *hv*, a simple *v* or *w*. Diacritical points are put over *i* at the beginning of a word, or after another vowel with which it does not form a diphthong. Numbers are distinguished in the manuscripts by a dash over the letters, or by being enclosed by two dots. For punctuation a colon is sometimes used, and it serves to divide a discourse into parts generally larger than a proposition. No Gothic manuscript, however, separates the words of a sentence, or indicates whether a vowel is long or short. The Gothic verb distinguishes two voices, active and middle; two tenses, present and past; three moods, indicative, optative, and imperative; three numbers, singular, dual, and plural; an infinitive; and a present and a past participle. According to the formation of the tenses, there are three classes of verbs: the first forms the past by reduplicating the verbal root; the second distinguishes the tenses by a change of vowel; the third has a special form only for the present tense, forming the past by means of formative endings. Grimm designates the first two classes as strong, and the third as feeble. Examples: 1st class, *blanda*, blend, *baibland*, blended; *têka*, touch, *taitôk*, touched; 2d class, *binda*, *band*, *bund*, bind, bound, bound; *giba*, *gab*, *gêb*, give, gave, given; 3d class, *haba*, *habaida*, *habaips*, have, had, had; *sôkja*, *sôkida*, *sôkipe*, seek, sought, sought. The past tense is formed in the last class by adding *da*, reduplicated *dad*, the auxiliary *do*, *did*. The verb to be is conjugated as follows: Pres. ind. singular, *im*, *is*, *ist*;

dual, *siu* or *siju*, *siuts* or *sijuts*; plural, *sium*, *siup*, *sind*. Past ind. singular, *vas*, *vast*, *vas*; dual, *vésu*, *vésuts*; plural, *vésun*, *vésup*, *vésun*, &c. Nouns have three genders and two numbers. They have inflections for the nominative, genitive, dative, and accusative cases, and a few have also a vocative case, but only in the singular. The stems end either in the vowels *a*, *i*, *u*, or in the consonants *n*, *r*, *nd*, and these terminations determine the modes of the declensions. The thematic vowel of the declension in *a* is distinctly preserved only in the dative singular and the dative and accusative plural, and is lengthened into *ô* in the feminines. The *i* of the next declension takes gradation, and an *a* is introduced before it. The declension in *u* retains the vowel of its theme quite persistently, even before the case sign *s* of the nominative masculine and feminine, as well as in the nominative neuter, where the other declensions drop it. The *n* of the theme disappears in the nominative and vocative of the singular. The vowel of the primitive suffix *dar*, *par*, or *tar* (as in *fadar*, father, *brôpar*, brother, *daûhtar*, daughter, and *svistar*, sister), is dropped where a case sign is added; as gen. *brôps*, dat. *brôpr*. The themes in *nd* comprise present participles declined as substantives. Adjectives are inflected differently, adopting in about half of the cases the demonstrative pronoun *ja*, and assimilating with it; as *hardus*, hard, *hardjis*, *hardjamma*, &c. The comparative degree is rendered by means of the suffixes *is* and *ôs*, which retain their form at the end of adverbs, but are lengthened into *izan* and *ôzan* at the end of adjectives. The superlative is formed by adding *ta* or *tan* to the *is* or *ôs* of the comparative; as *frôda*, clever, comp. masc. and neut. *frôdôzan*, fem. *frôdôzein*, sup. masc. *frôdistâ*, fem. *frôdisto*, &c. The personal pronouns are: *ik*, I; *þu*, thou; *is*, he; *si*, she; *ita*, it; *weis*, we; *vit*, we two; *jus*, you; *eis*, they masc.; *ijôs*, they fem; *ija*, they neut. Prepositions govern the genitive, dative, or accusative, and precede the words they govern. Only three interjections have been found: *ô*, oh; *sai*, behold; *vai*, woe! (See the pronouns *sa*, *sô*, *pata*, he who, she who, that which, are used as definite articles. There is no indefinite article.—The literary documents in which the Gothic language has been preserved consist of a few manuscripts. The *Argenteus Codex*, now in the library of the university of Upsal, written in silver and partly gold letters, is a purple parchment, supposed to date from about the beginning of the 6th century, at the time of the rule of the Ostrogoths in Italy. (See ARGENTUS CODEX.) It comprised originally 330 sheets, with Ulfilas's translation of the gospels of Matthew, John, Luke, and Mark, in this order; but only 177 sheets have been preserved. (See ULFILAS.) The *Codex Carolinus* is a rescript, like all codices except the preceding, and is owned by the Wolfenbüttel library. It was discovered in 1756, and is also supposed to be of Italian origin. It con-

tains about 42 verses of the 11th to the 15th chapter of the epistle to the Romans. The five *Codices Ambrosiani* form part of the Ambrosian library in Milan, and contain fragments of the Pauline epistles, of the gospels of Matthew and John, of the books of Ezra and Nehemiah, and a calendar. They were discovered in 1817 at the convent of Bobbio in Italy. There is a parchment manuscript in Vienna dating from the 9th century, which contains a Runic and several Gothic alphabets, with a few words and numerical notations. Naples and Arezzo have each a Gothic certificate of sale written on papyrus. Another manuscript was discovered in 1866 by Franz Pfeiffer. It has received the appellation of *Codex Turinensis*, and consists of four sheets which had been used as the cover of a book or manuscript, and which contain fragments of the epistles to the Colossians and Galatians. Von der Gabelentz published an account of it in the *Germania* of 1867, and pronounced them illegible. In the following year, however, a translation by Massmann appeared in the same periodical. A complete edition of the literary monuments of the Gothic language has been published in Leipsic by Von der Gabelentz and Löbe (1836-'42), and another in Stuttgart by Massmann (1856-'7). Andreas Uppström has caused an exact reprint to be made of every line of Gothic manuscript extant. He published in this manner in 1854 the *Codex Argenteus*, and in 1861 the *Codex Carolinus* and some of the Ambrosian fragments. He died in 1865, and his son published in 1868, from his posthumous papers, the remaining documents. Since the texts could thus be critically studied, the Gothic grammars and vocabularies have been considerably changed. The latest researches are embodied in the 5th edition of Stamm's *Ulfilas, oder die uns erhaltenen Denkmäler der gothischen Sprache: Text, Wörterbuch und Grammatik*, which has been revised by Moritz Heine (Paderborn, 1872).

GOTHLAND. See GOTTLAND.

GOTHS (Lat. *Gothones*, *Guttones*, &c.), an extinct Germanic race, first mentioned as dwelling on the coasts of the Baltic during the 4th century B. C., and disappearing from history in the 8th century A. D. Their origin has not been ascertained. Pytheas of Massilia is the first who makes mention of them; he found them at the side of the Teutons in the southern portion of the Baltic region. Pliny, in the 1st century A. D., and Ptolemy, in the 2d, place them in the same territory. The name of Getæ given to them by later historians does not properly belong to the Gothic race, though Grimm's hypothesis connects the Getæ with the Goths. Cassiodorus, the principal minister of Theodoric the Great, wrote a history of the Goths, which chronicles their migrations and wanderings from regions beyond the Baltic. Procopius speaks of Goths, Vandals, and Gepidæ as one people in all respects, and describes them as of fair complexion, with reddish yellow hair and

tall manly forms. Modern authorities consider the Vandals, Heruli, Rugii, Gepidæ, Alani, Suevi, Longobards, Burgundians, and Franks as the principal families of the Gothic race.—In the latter half of the 2d century A. D. the Goths appear on the N. shores of the Black sea. In the 3d century they were in possession of the region N. of the lower Danube. They invaded the Roman territory in 237, plundered Thrace, and defeated the emperor Decius in 251. A few years later they were defeated by Æmilianus; but in 262 they ravaged Greece, and in 269 invaded the Roman empire again. The emperor Claudius defeated them in that year at Naissus. In 272 they obtained possession of Dacia. They invaded Mœsia in 332, but were repulsed. In 366 they assisted in the revolt of Procopius; but Valens defeated and drove them beyond the Danube. Meanwhile they had become divided into Ostrogoths and Visigoths, or Eastern and Western Goths. The former inhabited southern Russia between the Dniester and the Don; the latter the territory from the lower Danube to the Carpathian mountains, and from Hungary to Bessarabia. Ermanric, who ruled over both bodies, came in collision with the Huns in 375, and was defeated by them. The Goths put themselves thereupon under the protection of Valens, who assigned them a territory in Thrace; but reaching the provinces of Mœsia (Bulgaria and Servia), they took possession of the country, defeated Valens in a battle near Adrianople in 378, and ravaged Achaia and Pannonia. The Visigoths submitted to the Romans in 382; but the Ostrogoths continued their ravages several years longer, and finally settled in Thrace and Phrygia. Several Gothic tribes had already embraced the Christian faith, and about the year 360 Ulfilas, bishop of the tribes who dwelt in Mœsia and Thrace, had translated the New Testament into the Gothic language. Upon the death of Theodosius, the barbarian nations took advantage of the dissensions of his successors to overrun the divided empire. The Huns poured in from one direction, while an army of Goths under Alaric invaded the region between the Adriatic and Constantinople, and subsequently marched into Italy and sacked Rome. (See ALARIC.) The Goths gradually intermingled in blood with the inhabitants of Italy. The Huns under Attila, 500,000 barbarians of many tribes, now threatened Italy and entered Gaul (A. D. 451). They were encountered by Romans and Goths, combined under command of Aëtius, and suffered a terrible defeat. Theodoric, king of the Visigoths, was among the slain on the side of the Romans. Meanwhile Spain and southern France came under Gothic dominion; and Odoacer, a prince of the Heruli, penetrating into Italy, dethroned Augustulus, the last of the West-Roman emperors, and assumed the title of king of Italy (A. D. 476). Zeno was emperor of the East, and, becoming embroiled with the Ostrogoths under Theodoric, consented to an invasion of Italy by this prince.

Theodoric accordingly crossed the Alps, defeated Odoacer, compelled from him, at Ravenna, the surrender of all Italy, and put him to death (493). Italy had begun to prosper under Odoacer, and the impulse was increased by the new king, who reigned 33 years. Profiting by the Gothic disorders consequent upon the death of Theodoric in 526, Justinian sent Belisarius to Italy. He took Rome, and, gaining the admiration of the Goths, was invited to be their king. This he refused, but held the Goths in subjection for his master. Totila, a noble Goth, rebelled, and mastered southern Italy. He was about to destroy Rome, but, yielding to the remonstrance of Belisarius that it would add more to his honor to spare it, contented himself with dispersing the inhabitants (546), and reappearing it before the arrival of a fresh army from Constantinople under Narses. Totila fell in battle (552), and his successor Teias suffered the same fate (553). Italy was reconquered, and the Gothic monarchy founded by Theodoric the Great was extinguished. In Spain and southern France the Visigoths maintained a splendid monarchy till 711, when Roderic was killed in battle against the Moors, who, crossing from Africa, subjugated the kingdom.—The Goths became a cultivated and enlightened people. Grotius gives them high commendation for morality, integrity, love of justice, and good faith. There never had been a better administration in Italy than that of Theodoric. He was an Arian, but the Catholics were not only unmolested by him, but themselves generally acknowledged that at no other period did their church enjoy greater prosperity. The Gothic princes and tribes were generally tolerant of the faith of others. They were also distinguished in some degree as friends of fine arts, science, and learning. Theodoric maintained overseers of works of art, whose duties were to guard the statues and to watch over the preservation of public buildings. These were kept in repair, and others were erected. The old Gothic style of architecture, comprising what are called transition styles with the rounded arch, Byzantine, Lombard, Norman, &c., was thus originated; a simple massive character of art, which must not be confounded with modern Gothic, which dates even later than the Lombards in Italy.—The laws of the Visigoths were digested into a regular code 50 years before the Pandects of Justinian, who possibly borrowed the idea of a code from the Visigothic princes. Theodoric and the Goths in Italy preserved and improved the Roman laws. (See CIVIL LAW, vol. iv., p. 623.) Their form of government was absolute monarchy of a mixed elective and hereditary nature; and it has been said of most of the Gothic rulers in Italy, that they made good the promise of Theodoric, who on ascending the throne said that he would strive so to rule the empire that the “only regret of the people should be that the Goths had not come at an earlier period.”

GÖTTINGEN, a city of Prussia, in the province and 57 m. S. by E. of the city of Hanover; pop. in 1871, 15,841. It is the seat of a university (*Georgia Augusta*), which was founded in 1734 by King George II. of England and elector of Hanover, and inaugurated Sept. 17, 1737. Through the eminence of several of its professors, among whom were Gesner, Heyne, Michaelis, and the two Eichhorns, it became toward the end of the century the most famous university in Europe. Its fortunes were not materially changed until the foundation of the university of Berlin (1810), which proved a formidable rival. The students, however, still numbered 3,000 in 1825, but the political disturbances of 1831 caused a great diminution in the attendance, which in 1834 was reduced to about 900. Yet the university could still boast of a brilliant array of names on its staff, among whom were Blumenbach, Ewald, Mitscherlich, Müller, Gervinus, Heeren, and the brothers Grimm. The new university building was inaugurated on the day of its 100th anniversary in 1837, but before the end of the year the government expelled seven of the ablest professors, who had protested against the abrogation of the Hanoverian constitution by King Ernest. Two of the expelled professors, Ewald and Weber, resumed their functions in 1848, but Göttingen has never recovered from the shock which it had received, although it numbered in 1873 101 professors and 925 students. The university library comprises 360,000 volumes and 5,000 manuscripts; it surpasses almost all other German libraries in its copious collections of modern works, and is one of the best arranged libraries in Europe. The academy of sciences comprises sections for mathematics, natural sciences, and history. The *Gelehrte Anzeigen*, the oldest learned periodical in Germany, is published under its auspices. The museum of natural history contains a collection bequeathed to it by Blumenbach, including human skulls of natives of all quarters of the globe, a large collection of coins, and some few works of art. Connected with the university are seminaries for theology, philology, mathematics, and natural sciences; hospitals, clinics, and an anatomical theatre; a botanical and economical garden, a school for veterinary surgeons, a chemical laboratory, a fine physiological institution, an observatory, and an agricultural school. Prominent among the other educational establishments is the industrial school of Wagemann. There are five Lutheran churches, including the university church, a Reformed and a Roman Catholic church, and a synagogue. The charitable institutions are numerous. The manufactures consist of cloth, woolen stuff, surgical instruments, soap, leather, turnery, gold and silver wares, &c.

GOTTLAND, or *Gothland*, an island in the Baltic, belonging to Sweden, between lat. 56° 55' and 57° 57' N.; length about 80 m., greatest breadth 33 m.; area, about 1,200 sq. m.; pop.

in 1873, 54,239. The island is generally level, and but here and there slightly hilly. The climate is temperate, the mulberry and grape ripening in the open air. The people are chiefly employed in rearing cattle and fishing off the coast. The island possesses several good harbors. The chief towns are Wisby and Slite, the latter protected by forts. A submarine telegraph connects the island with the mainland of Sweden.

GOTTSCHALK, *Louis Moreau*, an American pianist and composer, born in New Orleans, May 8, 1829, died in Rio de Janeiro, Dec. 18, 1869. His father was an Englishman of German-Jewish descent, and his mother was of French extraction. Louis was their eldest child, and gave evidences of a remarkable musical organization at three years of age. At six he took lessons on the piano and violin, and at twelve was sent to Paris, receiving there instruction from Hallé and Camille Stamaty on the piano and from Maleden in harmony. He also formed the friendship of Hector Berlioz, from whom he received valuable advice. His first appearance as a pianist was on the continent, and it was not until Feb. 11, 1853, that he was heard in the United States, in concerts in New York and elsewhere. The class of music that he played and his skill made for him at once a widely extended reputation, and during his whole career he commanded the admiration of large and enthusiastic audiences. Although a composer, his published works exceeding 50 in number, he was preëminently a pianist. His compositions grew out of his love for the instrument, and were almost all written with a view to its capabilities. He seemed to have no grasp of musical effects except such as were producible upon the piano. The pieces on which his reputation principally rests were illustrative of tropical life, such as *Le bananier*, *La savane*, *Ricordati*, *La marche de nuit*, *O ma charmante*, *Le mancenillier*, *Réponds moi*, *Ojos criollos*, and many Cuban dances. His arrangements of the compositions of others are few in number and of no special merit; nor had he any exceptional skill as an interpreter of the works of other composers. He constantly played his own compositions, and with a sensuous charm that no other pianist could approach. His touch was one of extreme delicacy as well as force, and there were no difficulties of the instrument that he had not mastered. The piano sang under his hand with wonderful expression. He died suddenly while at the height of his reputation.

GOTTSCHALL, *Rudolph*, a German poet and dramatist, born in Breslau, Sept. 30, 1823. He studied law at Königsberg, where he published anonymously in 1842-'3 *Lieder der Gegenwart* and *Censurflüchtlinge*. He was afterward expelled from the university of Breslau on account of a political demonstration made in his favor. After some time he was allowed to resume his studies in that city, but could not obtain a license as a professor, though he re-

ceived a diploma as doctor of philosophy at Königsberg, where he became a dramatist. Subsequently he resided at Hamburg, Breslau, and Posen, and from 1864 at Leipsic as editor of *Unsere Zeit*, of *Blätter für literarische Unterhaltungen*, and of *Der neue Plutarch* (1874 *et seq.*). His poetical works include *Gedichte* (1849), *Die Göttin* (1853), *Carlo Zeno* (1854), *Neue Gedichte* (1858), *Kriegslieder* (1871), and *Janus: Friedens- und Kriegsgedichte* (1873). The most renowned of his plays are the comedy *Pitt und Fox*, the drama *Mazeppa*, and the tragedies *Katharina Howard* and *Herzog Bernhard von Weimar*. Among his prose writings are *Die deutsche Nationalliteratur im 19. Jahrhundert* (3 vols., 1853-'72), *Poetik* (1858), and *Porträts und Studien* (4 vols., 1870-'71).

GOTTSCHED, Johann Christoph, a German author, born at Judithenkirch, near Königsberg, Feb. 2, 1700, died in Leipsic, Dec. 12, 1766. He was educated at Königsberg, studied theology, but abandoned it for philosophy and belles-lettres, and was for 32 years professor of logic and metaphysics at Leipsic. He became president of the literary society of Leipsic in 1726, held for a time a sort of literary dictatorship in Germany, placing purity of language and clearness and elegance of style above all other literary merits, while his opponents of the Zürich school, Bodmer and others, contended for originality and genius. He was an indefatigable author, and left tragedies, translations, philosophical treatises, and various controversial and critical works. His chief merit was in contributing to make the German language the sole medium of instruction, by publishing popular manuals and abridgments of scientific and philosophical works in the vernacular tongue.

GOUDA, a town of the Netherlands, in the province of South Holland, on both banks of the Gouw at its junction with the Neder Yssel, 11 m. N. E. of Rotterdam; pop. in 1868, 15,776. It is entered by five gates, and has canals through the centre of all its streets. It has five churches, that of St. John being very magnificent. The principal manufactures are tobacco pipes, cotton fabrics, parchment, leather, and white lead.

GOUGH, Hugh, viscount, a British general, born at Woodstown, Ireland, Nov. 3, 1779, died March 2, 1869. He entered the army in 1794, and, after serving against the Dutch at the Cape of Good Hope and in the West Indies, in 1809 joined the British forces in Spain, distinguishing himself at Talavera, Barrosa, Vitoria, Nivelle, &c. During the war in China (1841) he was commander-in-chief of the land forces, and for his services was made a baronet. Having been transferred to India with the supreme command, in December, 1843, he gained the battle of Maharajpore against the Maharrattas of Gwalior. Upon the breaking out of the first Sikh war in 1845, he defeated the enemy at Moodkee, Dec. 18, and again at Ferozeshah on the 22d. He finished

the campaign, Feb. 10, 1846, by taking the intrenched camp of the Sikhs at Sohraon, though with terrible loss to his own troops. For these victories he was raised to the peerage as Baron Gough. His services in the second Sikh war (1848-'9) were characterized by bravery rather than generalship. At Mamnuggar an indecisive battle was fought. Another at Chillianwallah (Jan. 13, 1849) came near being a defeat; but after a severe struggle the British remained masters of the field, though with the loss of nearly 2,500 men. On Feb. 21 Gough completely routed the Sikhs at the town of Guzerat. News of the dearly bought victory of Chillianwallah having reached England, Gough was superseded in the command of the Indian army by Sir Charles Napier. The veteran, however, was raised to the additional rank of viscount in acknowledgment of his bravery and long service, was thanked by parliament, and a pension of £2,000 was settled upon himself and his two next successors. He was made field marshal in 1862, and at his death was commander of the forces.

GOUGH, John B., an American orator, born at Sandgate, England, Aug. 22, 1817. He came to America in 1829, and soon after became a bookbinder's apprentice in New York. He became intemperate, and was accustomed to sing and recite in grog shops, where his powers of mimicry and action made him a favorite. He fell into great poverty, but about 1840 took the temperance pledge, and soon began to lecture on temperance, both in America and England. In time he added other subjects, and became a very popular orator. In November, 1873, he recited one of his orations in New York, announcing that this would probably be his last public appearance in that city. He has published his autobiography (1846), and a volume of orations (1854). He resides near Worcester, Mass.

GOUGH, Richard, an English antiquary, born in London, Oct. 21, 1735, died Feb. 20, 1809. He was a fellow of the royal society, and for many years director of the society of antiquaries, of which he wrote a history, and to whose *Archæologia* he was a frequent contributor. Among his works are enumerated an edition of Camden's *Britannia*, the valuable additions to which were the fruit of many excursions through England, Scotland, and Wales; "Anecdotes of British Topography" (4to, 1768; enlarged, 2 vols. 4to, 1780); and "Sepulchral Monuments of Great Britain" (3 or 5 vols. fol., 1786-'96).

GOUJET, Claude Pierre, a French author, born in Paris, Oct. 19, 1697, died there, Feb. 1, 1767. He was educated at a college of Jesuits, entered the order of Oratorians, and proved a zealous Jansenist. His labors as historian, compiler, and critic injured his health during his later years; he lost his sight, and was obliged to sell his library. Of his many works the following are the most important: *Bibliothèque des écrivains ecclésiastiques* (3 vols.,

1736); *Dissertations sur l'état des sciences en France depuis la mort de Charlemagne jusqu'à celle du roi Robert* (1737); *Histoire du pontificat de Paul V.*; *Bibliothèque française, ou Histoire littéraire de la France* (18 vols. 12mo., 1740-'59); *Mémoire historique et littéraire sur le collège royal de France* (4to, 1758); and *Mémoires historiques et littéraires* (1767). He edited Richelet's *Dictionnaire*, and Moreri's *Dictionnaire historique*.

GOUJON, Jean, a French sculptor, born in Paris about 1515, said to have been killed there on St. Bartholomew's day, Aug. 24, 1572. Little is known of his life until 1541, when he was employed at Paris in producing the beautiful sculptures of the roof loft of St. Germain-l'Auxerrois, and at Rouen in the cathedral and in the church of St. Maclou. In 1548 Henry II. employed him in decorating the château of Anet, which he was building for his mistress, Diana of Poitiers. There he produced the celebrated group, now belonging to the Louvre, of Diana and the stag. Another huntress Diana by him is in the château of Malmaison. In 1550 the *fontaine des innocents* was commenced in the rue St. Denis; it was transported in 1788 to the square which it now adorns. He was also employed as an architect on the old Louvre. Several of his best works are still extant. See *Œuvres de Jean Goujon*, with 90 outline plates by Reveil (Paris, 1844).

GOULBURN, a city of New South Wales, Australia, in Argyle co., near the junction of the Mulwarree ponds and Wollondilly river, on the Great Southern railway, 120 m. S. W. of Sydney; pop. about 3,500. It is the seat of an Anglican and a Roman Catholic bishop. Prominent among the public buildings are several churches, the hospital, the mechanics' institute, the court house, and the jail. The progress of the town has thus far been chiefly due to agriculture; but in its vicinity are found gold, copper, and other metals, and marble. Goulburn was made a city in 1865. In 1872 it had three newspapers.

GOULBURN, Edward Meyrick, an English clergyman, born in 1818. He was educated at Eton, and at Balliol college, Oxford, became fellow of Merton college in 1841, and for a number of years was a tutor in the university, being at the same time incumbent of Holywell, Oxford. In 1850 he was elected head master of Rugby school, and in 1858 became minister of Quebec chapel and prebendary of St. Paul's, London. He was also appointed one of the chaplains in ordinary to the queen and incumbent of St. John's, Paddington, and in 1866 was made dean of Norwich. Dean Goulburn is a voluminous and popular writer. Among his chief works are: "The Doctrine of the Resurrection of the Body" (Bampton lectures, 1850); "Principles of the Cathedral System Vindicated;" "Thoughts on Personal Religion," with a sequel on the "Pursuit of Holiness;" "Sermons in Norwich" (1870); and "The Holy Catholic Church" (1873).

GOULD, Augustus Addison, an American naturalist, born in New Ipswich, N. H., April 23, 1805, died in Boston, Sept. 15, 1866. His father's family name was Duren, which was changed to that of Gould. He graduated at Harvard college in 1825, took his medical degree in 1830, and commenced practice in Boston. During his college life he devoted his spare moments to the study of natural history; in the early part of his professional career he lectured frequently on scientific subjects, and for two years gave instruction in botany and zoölogy at Harvard college. In 1855 he delivered the annual discourse before the Massachusetts medical society, and in 1856 received the appointment of visiting physician to the Massachusetts general hospital. He was an accomplished naturalist, and in the department of conchology stood preëminent both at home and abroad. His principal published works are: a translation of Lamarck's "Genera of Shells" (1833); "System of Natural History" (1833); "The Invertebrate Animals of Massachusetts" (1841); "Principles of Zoölogy," with Prof. Agassiz (1848); "Mollusca and Shells of the United States Exploring Expedition under Capt. Wilkes" (4to, 1852, with an atlas of plates); the completion of Dr. A. Binney's "Land Mollusks of the United States" (3 vols. 4to, 1851-'5); "The Mollusca of the North Pacific Expedition under Capts. Ringgold and Rogers" (1860); and "Otia Conchologica" (1863). He was also a frequent contributor to scientific and literary periodicals.

GOULD, Benjamin Apthorp, an American astronomer, born in Boston, Sept. 27, 1824. After graduating at Harvard college (1844), he went to Göttingen, where he pursued his mathematical and astronomical studies under Gauss, and took his degree in 1848. He was for some time an assistant in the observatory at Altona with Schumacher and Petersen. After visiting many of the chief observatories of Europe and spending some time at each, he returned to America, and was employed in the United States coast survey, having charge of the longitude determinations, the telegraphic methods of which he very greatly improved. In 1866 he made the first determinations of transatlantic longitude by telegraph cable. In 1856 he was appointed director of the Dudley observatory at Albany, and superintended its building and arrangement in 1857-'8. His occupancy of this post ended in January, 1859, owing to a disagreement with the trustees of the institution, which led to a prolonged and painful conflict, carried on through pamphlets and the public press. A committee of scientific men subsequently justified the action of Prof. Gould in the matters leading to this misunderstanding. In 1868 he was appointed to organize and direct the national observatory of the Argentine Republic at Cordova. After ordering the instruments in Europe and erecting the building at Cordova, he began work there with four assistants in 1870. Since that time he has

completed a set of maps of the stars visible with the naked eye from his observatory, with their positions and magnitudes, and afterward undertook a series of zone observations of southern stars. Up to April 15, 1874, the great number of 83,000 stars had been observed. Prof. Gould's principal works are: "Report on the Discovery of the Planet Neptune" (Smithsonian Institution, Washington, 1850); "Investigation of the Orbit of Comet V." (Washington, 1847); "Discussions of Observations made by the United States Astronomical Expedition to Chili, to determine the Solar Parallax" (Washington, 1856); "Discussion on the Statistics of the United States Sanitary Commission;" and the charts of stars already named, with others of scarcely less importance. In 1849 he founded at Cambridge, Mass., the "Astronomical Journal," the expenses of which were long borne by himself and a few friends. He continued to conduct it until its suspension in 1861.

GOULD, Hannah Flagg, an American poetess, born at Lancaster, Mass., in 1789, died at Newburyport, Sept. 5, 1865. She was a frequent contributor to periodical literature, and published a volume of poems in 1832, a second in 1836, and a third in 1841. Her other books are: "Gathered Leaves," a collection of prose sketches (1846); "The Diosma," containing original and selected poems (1850); "The Youth's Coronal" (1851); "The Mother's Dream, and other Poems" (1853); and "Hymns and Poems for Children" (1854).

GOULD, John, an English naturalist, born in Lyme, Dorsetshire, Sept. 14, 1804. Between the ages of 14 and 20 he resided at the royal gardens at Windsor, studying the habits of birds and collecting specimens. He was afterward engaged to prepare specimens for the museum of the London zoological society, and published "A Century of Birds from the Himalayan Mountains," with illustrations by his wife (fol., London, 1832). He next published "The Birds of Europe" (1832-'7). In 1838 he went to Australia, where he resided two years, collecting materials for his "Birds of Australia," also illustrated by his wife (7 vols. fol., 1842-'8), and for the "Mammals of Australia" (1845-'59). His "Monograph of the Trochilidae" (fol., 1850) was suggested by his unrivalled collection of humming birds, of which he had procured 2,000 specimens, illustrating 320 species. Among his remaining works are: "Monograph of the Ramphastidae" (fol., 1833-'5); "Icones Avium" (1837-'8); "Monograph of the Trogonidae" (1835-'8); "Monograph of the Macropodidae, or Family of Kangaroos" (1841-'2); "Monograph of the Odontophorinae, or Partridges of America" (1844-'50); a supplement to the "Birds of Australia," containing species recently discovered; and a "Handbook to the Birds of Australia," giving all the information on the subject to the close of 1865. In 1873 he was preparing works on Asiatic and on British birds.

GOUDON, Charles François, a French composer, born in Paris, June 17, 1818. He studied counterpoint at the Paris conservatory under Halévy, receiving also instructions in composition from Lesueur and Paër. In 1837 he received the second prize of the institute, and in 1839 he obtained the first premium for his cantata *Fernand*. In consequence of this success he became privileged to pursue his training at Rome at the government expense, and there devoted himself to ecclesiastical music. In 1843 he visited Vienna, where he procured the performance, in the church of St. Paul, of a mass for voices only, in the style of Palestrina. Returning to Paris, he was appointed musical director at the church of the Missions Étrangères. Here he adopted the monastic garb, and remained in obscurity till 1851. On April 16, 1851, he produced unsuccessfully his first opera, entitled *Sappho*. In 1852 some choruses, written for M. Ponsard's classical tragedy *Ulysse*, were performed at the Théâtre Français. In October, 1854, *La nonne sanglante*, a grand opera, was performed unsuccessfully, as was in 1858 an attempt at comic opera, consisting of a musical setting of Molière's *Médecin malgré lui*. On March 19, 1859, was produced at the Théâtre Lyrique the work on which Gounod's reputation chiefly rests, *Faust*. This was succeeded by *Phlémon et Baucis*, a three-act opera; *La reine de Saba*, a grand opera; *Mirella*, an Italian version of the French *Mireille*; and *Romeo e Giulietta*. In addition to these works, he has composed masses, psalms, and motets, for single and double chorus. Among the most praiseworthy of his compositions of this class are his "St. Cecilia Mass" and a setting of the psalm "By the Waters of Babylon." Of late years he has lived principally in London.

GOUR, Ganr, or **Lucknont**, a ruined city of Bengal, British India, 179 m. N. of Calcutta. Its remains are spread over a range of low hills which extend along the E. bank of the Bhagruttee, and cover a space 7 m. long (15 m. including suburban villages) by 2 or 3 m. broad. Many of the buildings have been demolished for the sake of the bricks of which they were constructed, but several grand edifices are still standing. Of these the most remarkable are a mosque, built of brick, and lined with a kind of black porphyry, a curious building faced with bricks of various colors, an obelisk 100 ft. high, numerous reservoirs, and two lofty gates of the citadel. Several villages have grown up on part of the site, and the rest is mainly covered with forests or is under cultivation.—The earliest record of Gour dates from 648, when it was governed by independent chieftains. At the beginning of the 13th century it was taken by an officer of the viceroy of Delhi under Shahal ud-Din, monarch of Ghore in Afghanistan; and in 1212 it became the capital of Bengal, an eminence which it retained, except during an interval of about 50 years previous to 1409, until the British

gained possession of the district in the 18th century. Its decline, however, began about 1574, when Monaim Khan, commander of Akbar's troops, captured it and made it the seat of an independent power, but in a few months fell a victim, with nearly all his troops, to the deadly climate. No cause has since contributed so much to its decay as the diversion of the Ganges from its former to its present channel, 4 or 5 m. distant, in the 17th century.

GOURD (Fr. *gourde*, a swelling), a name applied in Europe to plants of the order *cucurbitaceæ* in general, but restricted in the United States to the *lagenaria*, the hard shell of which is put to various domestic uses. To the gourd family belong the pumpkin, squash, watermelon, cucumber, muskmelon, and several others cultivated for ornament or known as weeds. The members of the family are succulent tendril-bearing herbs with a watery juice; alternate and palmately ribbed, lobed, or angled leaves, and monœcious, sometimes diœcious

larger part, the lower portion forms a dish, while the upper serves as a funnel. A variety is known at the west as sugar-trough gourd, the large flattened-spherical shell of which will hold several gallons. Hercules's club or California gourd produces a fruit sometimes 5 or 6 ft. long. Under the name of ornamental or fancy gourds several, mostly species of *cucurbita*, are grown for their small, handsomely marked, and variously shaped fruit. (See PUMPKIN, and SQUASH.)

GOURGAUD, Gaspard, baron, a French general, born in Versailles, Sept. 14, 1783, died July 26, 1852. He studied at the polytechnic school, and at that of Châlons, entered the army in 1802, and fought in the campaigns of Germany (1805-6), of Poland (1807), of Spain (1808), and again in Germany (1809). Sent to Dantzic in 1811 to examine the strength of its fortifications, his reports gained the favor of Napoleon, whom he accompanied to Russia in 1812. He was wounded at Smolensk; at Moscow he prevented an explosion of 5,000 cwt. of gunpowder stored in the Kremlin, and was rewarded with the title of baron. On the retreat he proved his bravery at the passage of the Beresina. He was first *officier d'ordonnance* to Napoleon during the campaign in Saxony in 1813, where after the battle of Leipsic he saved the corps of Oudinot by delaying the command of Napoleon to destroy the bridge of Freiberg. After the battle of Brienne in the campaign of 1814, he saved Napoleon at Mézières from a troop of Cossacks, one of whom was already aiming his lance at the emperor. After the fall of Napoleon he was well treated by the Bourbons, on whose flight he joined the emperor (1815). Made general after the battle of Fleurus, he was among the last on the battle field of Waterloo, followed Napoleon to Malmaison and Rochefort, and carried his letter to the prince regent of England. Chosen one of the three who were allowed to follow the emperor in his exile, he lived three years at St. Helena, but left the island in consequence of illness and misunderstandings, went to England, and tried in vain to interest the congress of Aix-la-Chapelle and Maria Louisa in favor of the emperor. In 1821 he was allowed to return to France, where a legacy from Napoleon enabled him to live independently, though deprived of his titles. Together with Gen. Montholon he published the *Mémoires de Napoléon à Sainte-Hélène* (8 vols., London, 1823). His *Examen critique* (1825) of Ségur's "History of the Grand Army" caused a duel between the two generals, and was followed by a sharp controversy with Sir Walter Scott, who accused him of having compromised his master at St. Helena. Under Louis Philippe he was made peer of France, and in 1840 accompanied the duke de Joinville on his voyage to St. Helena, to bring the remains of Napoleon to Paris. In 1849 he was elected to the legislative assembly, where he voted with the conservatives.



Common Gourd (*Lagenaria vulgaris*).

flowers; the calyx coherent with the ovary (flower superior); corolla mostly monopetalous; the stamens are usually three and singularly contorted and united; the fruit generally fleshy, but sometimes with a hard shell when ripe. The common gourd, bottle or calabash gourd, *lagenaria vulgaris*, is a native of Asia and Africa; it climbs to a great distance, and has clammy, unpleasantly scented leaves. The sterile flowers are on long stalks, white with greenish veins; the fertile on short stalks, and producing a fruit that varies much in shape. The commonest form is shaped like a water bottle with a large base and a swollen handle; the rind of this when ripe is very hard and woody. By making an opening at the place where the stem joins the fruit and removing the contents, it makes, after soaking to remove the bitterness, an excellent water bottle. With an opening in the side it is a convenient dipper; and when sawed in two across the

GOURGUES, Dominique de, a French adventurer, born at Mont-de-Marsan, Gascony, about 1530, died in Tours about 1593. He served in the war with Spain, was taken prisoner in Italy and put in chains in the galleys, was captured with the vessel by the Turks, and recaptured by the knights of Malta. He afterward made voyages to Africa, Brazil, and the East. In 1567 he sailed from Bordeaux, with three small vessels equipped with 100 arquebusiers and 80 sailors, to avenge the massacre of the French colonists in Florida by the Spaniards under Menendez. He landed at St. Mary's river, made an alliance with an Indian chief, who joined him with 300 savages, captured Fort San Mateo on the St. John's river, and two other forts, slaughtered most of the garrisons, and hung his prisoners on the same trees on which the French had suffered. Menendez had placed over his victims the inscription, "Not as to Frenchmen, but as to Lutherans;" and Gourgues retaliated by putting over the Spaniards whom he executed, "Not as to Spaniards, but as to traitors, robbers, and murderers." On his return to France his surrender was demanded by the Spanish ambassador, but he found asylum among his friends at Rouen, and lived in obscurity for many years. When Queen Elizabeth of England, hearing of his misfortunes, invited him to enter her service, the French king restored him to favor. Shortly before his death Dom Antonio of Portugal appointed him commander of his fleet against Philip II. An account of his expedition to Florida was published by Basanier, *Voyage du capitaine Gourgues dans la Floride* (4to, 1586). Parkman's "Pioneers of France in the New World" (1865) has a full account of Gourgues.

GOUSSET, Thomas Marie Joseph, a French prelate, born at Montigny-les-Cherlieux, Haute-Saône, May 1, 1792, died in Rheims, Dec. 24, 1866. He was the son of a peasant, and labored in the field until his 17th year. In 1817 he was ordained priest, and after a brief interval was appointed professor of moral theology in the seminary of Besançon, where he remained for 17 years. In 1825 he published *Exposition de la doctrine de l'Eglise sur le prêt à intérêt*, which showed that he was far in advance of the common opinion regarding usury. Other writings on the relations between the civil code and moral theology brought him to the notice of the government; and in 1835 he was made bishop of Périgueux, and in 1836 archbishop of Rheims. In 1850 he was created a cardinal and senator of France. Throughout his career he never forgot his humble origin, and delighted to have his aged father, clad in his homely peasant's garb, placed conspicuously in a seat of honor near himself in the services of his cathedral. His most remarkable works are *Théologie dogmatique* (2 vols. 8vo, 1844; 8th ed., 1856), and *Théologie morale* (2 vols. 8vo, 1848; 12th ed., 1862), which are to be found in almost every priest's library on both sides of the Atlantic.

GOUT, a painful disease affecting principally the fibrous tissues about the smaller joints, and intimately connected with an excess of uric acid and its compounds in the blood. Various names have been given according to the part affected, as podagra when in the feet, chiragra when in the hands, &c.; but all such, and probably many cases of neuralgia accompanied by oxalic deposits in the urine, are mere forms of one disease. A common attack of acute gout is generally preceded by uneasiness, indigestion, loss of appetite, nausea, and vomiting, biliary derangement, dull pains or numbness in the parts to be affected, often with feverish symptoms; but in some cases, on the contrary, the disease comes on in the midst of apparent health and well-being, and occasionally at night during refreshing sleep. In most cases it makes itself known by an acute pain in the metatarso-phalangeal joint of the great toe; different sufferers compare this to the sensations produced by the contact of a drop of cold water, or of cold or heated metal, or by twisting, dislocation, or laceration, as by a nail or wedge driven into the foot; this is accompanied by feverish symptoms, urinary sediment, extreme tenderness, restlessness, involuntary muscular contractions, sleeplessness, and perspiration; the affected joint is swollen, red, and hot. This series of symptoms may last four or five days, to be followed after a day or two by three or four others, continuing in all from two to three weeks; the severity of the attack, its persistence, its seat, and its metastases vary according to circumstances. This first warning past, the luxurious epicure may not receive another, even if he persist in his indulgences, for months, or perhaps years; but the second comes, and the third, and so on, the intervals between the attacks becoming less; though the pain be less severe, the joints are more discolored and swollen, with oedema and chalky deposits in their neighborhood; and by a sudden retrocession toward the internal vital organs, life may be seriously threatened. When gout becomes chronic the attacks are more irregular, less severe, more frequent and sudden, leaving one joint for another after slight exposure to cold and moisture, excess at table, or vivid emotions; in this form, the continuance of the pain and the fear of injuring the gouty joints render its subjects cross, fretful, and disagreeable, though persons thus affected are often able to devote themselves to serious study and important private and public business. The pathology of gout reduces itself chiefly to the abnormal presence of uric acid in the blood, and to the deposit of urate of soda in the fibrous tissue around the joints and sheaths of tendons. Gout is rare before the age of 20, and men of robust constitution and of a mixed sanguine and bilious temperament are far more liable to it than females; it may be inherited, and seems independent of climate except so far as it influences the diet of a people, the northern races

being generally less temperate in the use of stimulating food and drinks than southern nations. A life of indolent sensuality, amid the excitements and passions of civilization in cities, and the use of highly seasoned animal food with alcoholic stimulants, are the predisposing causes to this disease. A person may have a gouty diathesis, and die from the evils arising from it, without having experienced what is popularly understood as a "fit of the gout;" the gout poison (uric acid) may be eliminated from the blood in any organ rich in fibrous tissue, and from recent researches it would seem that many cases of neuralgia (*sciatica* and *hemierania*), lithiasis, and oxaluria, with oxalate of lime deposits in the urine, are symptoms of the same morbid action, and excess of uric acid in the blood either from over production or accumulation; the habits and manner of life, the tissues most affected, and the peculiar urinary deposit, indicate the identity of the above forms of disease, and the propriety of the same treatment in all. Organic chemistry teaches that in the gouty diathesis, with excess of urates and oxalates, there is a deficiency of oxygen in the system; hence the uric acid may remain unchanged, or may be oxidized only into oxalic acid, the latter remaining as such instead of undergoing further oxidation and being converted into carbonic acid and urea, in which forms it can be removed from the organism. We find gout attacking the upper ranks of society, who indulge in a highly nitrogenous diet, which tends to produce uric acid in excess, even though the normal quantity should be duly eliminated, and the disease assumes the form of urate of soda deposits in the joints; in the lower classes, consuming less animal and stimulating food, and taking in more oxygen from their daily exercise, the uric acid becomes the oxalic, and the gouty diathesis manifests itself in neuralgia with oxalate of lime in abundance in the urine. By many authors rheumatism is considered closely allied to gout; and accordingly cases of the latter disease affecting especially fibrous tissues are sometimes called rheumatic gout, a pathological hybrid as absurd and impossible as scarlatinic measles would be, as Dr. Garrod has clearly shown; a gouty person may have also rheumatism, but the two diseases are distinct and cannot pass the one into the other, the former having as a prominent character an excess of uric, and the latter of lactic acid.—There are few diseases which have more empirical remedies extolled for their cure than gout; almost every drastic purgative, diuretic, tonic, and narcotic has been pressed into the service, either for external or internal use. To say nothing here of soothing topical applications, colchicum has enjoyed, and deservedly, a great reputation in the treatment of gout and neuralgia, between the attacks and in their chronic forms; it is most efficacious when it acts upon the skin and bowels. The acetate of potash and other alkalies are in favor with

many, both for their diuretic property and as alkalinizing the acid in the blood and urine. Nitro-muriatic acid has been found of advantage for supplying the oxygen necessary for the conversion of the uric into oxalic acid, and the latter into carbonic acid and urea. The judicious use of purgatives, abstinence from highly nitrogenous food and stimulating drinks, attention to hygienic rules, and avoiding exposure to dampness, cold, and fatigue of body or mind, are absolutely necessary as aids in the treatment of this disease:

GOUVION SAINT-CYR, Laurent, a French marshal, born in Toul, April 13, 1764, died at Hyères, March 17, 1830. He studied the fine arts, and in 1792 enlisted among the volunteers who marched to the invaded frontier. Being elected captain by his companions, he was attached to the staff of Gen. Custine, and in the course of a year rose to the rank of general of division. In 1796 he commanded a division of the army on the Rhine under Moreau. In 1798 he was sent to Rome to reestablish discipline in the army, which had nearly revolted against Masséna, and succeeded. After the 18th Brumaire he again served under Moreau, and defeated Kray at Biberach (May 9, 1800). In 1801 he was sent as ambassador to Spain, and in 1802 commanded the French army of observation in southern Italy. He was too independent in his conduct and sentiments to please Napoleon, who assigned him to employment which gave him no opportunity of gaining distinction. In 1808 he was sent to Catalonia, and relieved Barcelona in spite of the scanty resources placed at his disposal; but dissatisfied with the treatment he received, he sent in his resignation and left his post without waiting for his successor. This being considered a breach of discipline, he was cashiered and ordered to his country seat, where he remained for two years in a kind of imprisonment. In 1811 he was called back to service, in 1812 commanded a corps in the great army which invaded Russia, and defeated Prince Wittgenstein at Polotzk on the Duna, Aug. 17–18; for this victory he was made a marshal. During 1813 he made a heroic stand at Dresden, signing at last an honorable capitulation, which however was not sanctioned by Prince Schwarzenberg, and he and his troops were sent prisoners to Austria. He consequently took no part in the events which marked the fall of the empire. He gave in his adhesion to the Bourbons, and on the second restoration became minister of war under Talleyrand, and again in 1817. He retired in 1819, and devoted his leisure to the preparation of his *Mémoires* (8 vols., 1829–'31).

GOVERNOR'S ISLAND, a fortified post of the United States, lying in New York harbor, at the entrance of East river, about $\frac{1}{2}$ m. S. of the Battery, and separated from Brooklyn by Buttermilk channel. It is about a mile in circumference, and contains Castle William, Fort Columbus, and South battery, the last commanding the entrance to Buttermilk channel.

GOWER, John, an English poet, born, according to tradition, in Yorkshire, though some authorities make him a native of Kent or of Wales, about 1325, died in 1408. He was a gentleman of considerable estate, and appears to have studied law and to have contracted a friendship with Chaucer. It has been said, but on insufficient proof, that he attained the dignity of chief justice of the court of common pleas. Like Chaucer he was a Lancastrian, and like him also a censurer of the vices of the clergy. Chaucer dedicates his "Troilus and Cressida" to Gower, calling him "moral Gower," and the latter in his *Confessio Amantis* introduces Venus calling Chaucer "my disciple and my poete." Gower's chief works are the *Speculum Meditantis*, a treatise on the duties of married life, in French verse, in ten books; the *Vox Clamantis*, a poem in seven books, describing in Latin elegiacs the insurrection of the commons under Richard II.; and the *Confessio Amantis*, an English poem in eight books, said to have been written at the suggestion of Richard II. Of these works the first is supposed to have perished, the second exists in manuscript copies, and the third, which was finished about 1393, was first published by Caxton in 1483. A new edition, with the life of the author and a glossary, by Dr. Reinhold Pauli, appeared in London in 1857 (3 vols. 8vo). Some smaller poems of no great merit are preserved in manuscript in the library of Trinity college, Cambridge; and Warton discovered in the library of the marquis of Stafford a volume of *balades* in French, which was printed in 1818 by Lord Gower for the Roxburghe club. Gower is known chiefly by his *Confessio Amantis*, which was undoubtedly suggested by Chaucer's English poems. Hallam says: "He is always sensible, polished, perspicuous, and not prosaic in the worst sense of the word." In his latter years he was blind.

GOYA, a city of the Argentine Republic, in the province and 100 m. S. of the city of Corrientes, on a small river of the same name, near its junction with the Paraná; pop. in 1869, 10,907, of whom only 1,839 were able to read. It is situated in a low, flat district, which in the rainy season is converted into a vast marsh. The city was founded in 1807, and considerably enlarged in 1850. Its industry is chiefly connected with cattle rearing.

GOYANNA, a city of Brazil, in the province of Pernambuco, on the river Goyanna, here crossed by two bridges, 1,200 m. N. N. E. of Rio de Janeiro; pop. about 9,000. There are several churches, a convent, a tannery, and public stores. A cattle fair is held weekly. The port, large and spacious, with sufficient depth of water for coasting craft, is 9 m. from the sea. The surrounding country is fertile, and in a high state of cultivation. The chief commerce is in cotton, sugar, rum, hides, timber, fancy woods, and castor oil, which are generally sent to the port of Recife.

GOYAZ. I. A central province of Brazil, lying between lat. 6° and 21° 5' S., and lon. 44° 35' and 50° 58' W.; area, 284,000 sq. m.; pop. about 151,000, besides about 12,000 independent Indians. It comprises the basin of the Tocantins above its junction with the Araguay, and the E. portion of the basin of the latter river, together with nearly the whole of the N. side of the basin of the Paranahyba. The surface is generally mountainous. The Cordilheira Grande traverses it from the extreme north to about lat. 16° S., where it unites with the Montes Pyreneos, the culminating point of which, Goyaz, has an elevation of about 9,500 ft. Several sierras extend from S. to N., forming for the most part the E. boundary, and with the Cordilheira Grande and the Pyreneos encircling the basin of the Tocantins. The main ranges are intersected by numerous subsidiary ones, from which the country slopes gradually down to the sea level. The geological structure is imperfectly known. It has been appropriately described as "a metamorphic island in a sea of sandstone, the sandstones having been swept away from the greater part of the river basins, leaving irregular metamorphic rocks exposed." The great plains and valleys lying between the mountains are watered by numerous rivers, among which is the Tocantins; this, formed by the union of the Maranhão and the Paranatinga, flows N. to its confluence with the Araguay, in the N. corner of the province, receiving in its course many considerable affluents. The Araguay, which belongs only in part to the province, is much larger than the Tocantins, and hence is properly the main stream, and is navigable for steamers, which run to Pará (Belem), at the mouth of the Amazon. Gold is found in many parts, the neighborhood of the capital being especially auriferous. Diamonds and other precious stones have been discovered in various places. The country is generally open, although there is an extensive forest tract lying near the capital. The lowlands are not well fitted for cultivation; but the highlands are fertile, producing millet, mandioca, rice, and a small species of beans. Cotton, coffee, and tobacco are produced; the grape flourishes, affording two vintages in the year. Melons, bananas, oranges, &c., abound. The vanilla bean, sarsaparilla, rhubarb, and senna grow spontaneously. Palms are numerous, especially the beautiful species known as the *buriti*, from the fruit of which is produced a beverage resembling wine. A considerable part of the province is especially adapted for grazing, and there are many cattle, horses, and swine. Wild animals and birds, especially macaws and parrots, are numerous. **II.** A city, capital of the province, on the river Vermelho, in lat. 16° 20' S., lon. 50° W., about 600 m. N. W. of Rio de Janeiro; pop. about 8,500. It is very nearly in the centre of Brazil, being almost equidistant from Pará, Porto Alegre, and the frontiers of Peru and Uruguay. The site is uneven,

but the streets are regularly laid out, although ill paved. Most of the houses are built with mud walls. The principal edifices are the governor's palace, the house of legislation, the prison, and the municipal slaughter house. One of the churches has a fine exterior. The river is here crossed by two handsome bridges. There is very little trade. The climate is salubrious, but in summer the heat is excessive. The town was founded in 1736, and was then called Santa Anna. It was incorporated as a city in 1739, when it received its present name of Goyaz, or, in full, Villa Boa de Goyaz.

GOZO. See MALTA.

GOZZI, Carlo, count, an Italian dramatist, born in Venice about 1720, died April 4, 1806. He early published some poetry, but was obliged to enlist in the army owing to pecuniary embarrassment. After three years he returned to Venice, and became the most witty member of the Granalleschi society, which was devoted to learning and also to convivial and burlesque purposes. He began to ridicule the plays of the abbatte Chiari, and ended by attacking those of Goldoni, against whom he directed his satire *La tartana degli infussi per l'anno bissestile* 1757, which made him famous. His dramatic pieces, based on fairy tales, were for a time exceedingly popular, especially *Turandote*, which Schiller adapted to the German stage. He afterward wrote tragedies. He published a complete edition of his plays in 12 vols. (Venice, 1791). Werthes translated his plays into German (5 vols., Bern, 1795), and Streckfuss prepared a German version of his fairy tales (Berlin, 1805). He facetiously gave to his autobiography the title of *Memorie inutili della vita di Carlo Gozzi* (3 vols., Venice, 1797).—His brother **GASPARO** (1713-'86) was a voluminous writer in prose and verse, but is best remembered as the author of the *Osservatore veneto* (published periodically), *Sermoni*, and other humorously critical productions. His works, including his *Difesa di Dante*, were collected in 16 vols. (1818).

GRAAF, Regnier de, a Dutch physician, born at Schoonhoven in 1641, died in Delft, Aug. 17, 1673. He was especially distinguished for having originated the discovery that reproduction takes place in the viviparous as well as in the oviparous animals by means of ovarian eggs, and that all animals are therefore essentially oviparous. The "Graafian vesicles" of the mammalian ovary were discovered and described by him, although he mistook their exact nature and considered them as true eggs, while they have since been shown to be only the receptacles within which the microscopic egg is contained. He also acquired a wide reputation by his investigations on the pancreatic juice. His works are: *Disputatio Medica de Natura et Usu Succi Pancreatici* (Leyden, 1664); *De Virorum Organis Generationi inservientibus*, &c. (1668); *Epistola de nonnullis circa Partes Genitales novis inventis* (1668); *Tractatus Anatomico-Medicus de Succo Pancre-*

atici Natura et Usu (1671); and *De Mulierum Organis Generationi inservientibus* (1672).

GRAAL, or **Grail**, the **Holy** (in old French, *sang gréal*; in old English, *sanggreall*; either from Fr. *saint*, holy, and the Celtic *greall*, Provencal *grazal*, and mediæval Latin *gradalis*, a vase or cup, or from the French *sang réal*, the "real blood" of Christ), one of the leading themes of mediæval romance, fabled to have been the cup or chalice used by Christ in the last supper, and in which he changed the wine into his blood. This chalice, preserved by Joseph of Arimathea, had also received the blood which flowed from the side of Christ on the cross. So says the apocryphal gospel of Nicodemus; but no early mention is made of it by either profane or ecclesiastical writers. In the 12th century, at the dawn of romantic literature, it reappeared as the central subject of the prophecies of Merlin, and the object of the adventurous quest of the knights of the round table. Romance mixed it up with the struggles in Spain between Moors and Christians, and with the foundation of the order of templars in Palestine. In the Arthurian romances Joseph of Arimathea (sometimes confounded with a bishop named Joseph sent by St. Augustine from Africa to England), on his arrival in Britain, consecrated his son first bishop of the island, and made his Christian relatives kings instead of the British pagan kings. Kept in prison by the Jews during the 50 years which immediately followed the death of Christ, he had been preserved from the approaches of old age by the possession of the holy graal, and was released by the Saviour in person, who taught him the words of the mass, and bade him renew daily the sacrament of the last supper. The holy graal lay thus at the foundation of the Christian priesthood. St. Joseph of Arimathea, in some forms of the legend, was the ever-living possessor of the precious relic; in others he died after the lapse of several centuries, bestowing his authority and the holy graal on his son, who in his turn died after consecrating one of his relatives as his successor. The last possessor, a contemporary of King Arthur, unmindful of his holy trust, sinned, and forthwith the holy vessel disappeared and was lost. The knights of the round table undertook the task of recovering it; but it baffled the seekers, as no one could see it who was not a virgin in body. Lancelot of the lake had arrived at the door of the chamber where the holy graal was; warned to depart, he nevertheless ventured to look in, "and saw a table of silver and the holy vessel covered with red samite, and many angels about it, whereof one of them held a candell of wax burning, and the other held a crosse and the ornaments of the altar." Having dared to enter, a blast of fire smote him to the ground, where he lay "twenty-four days and as many nights as a dead man." It was reserved to Sir Galahad, who was possessed of perfect purity, to behold it peacefully before his death. Immediately after

this event the holy grail was taken up to heaven. In other romances Sir Percival is distinguished in the place of Sir Galahad. At a later period several churches in France and Italy claimed to possess the holy grail; and in 1101 the crusaders obtained a cup which was believed for some time to be identical with it, and which is still preserved in the cathedral of Genoa.—The *Queste du Saint Graal* is among the longest of five great romances composing the Arthurian cycle. The *Percival* and *Titular* of Wolfram von Eschenbach treat the same subject. See also Tennyson's "Idyls of the King," and "History of the Holy Grail," edited from MS. by F. J. Farnivall (London, 1874).

GRACCHUS. I. Tiberius Sempronius, a Roman statesman, born about 168 B. C., died in 133. His father, Tiberius Gracchus, had been censor and consul, and had twice obtained a triumph. His mother, Cornelia, daughter of Scipio Africanus, had remained a widow, devoting herself to the education of her children, in which she was assisted by eminent Greek teachers. Tiberius, the oldest, made his first campaign in Africa under his uncle Scipio, and next filled the office of quaestor under the consul Mancinus in his unlucky campaign against the Numantines. The high regard in which the latter held both his father and his uncle induced them to grant to Tiberius, with whom alone they would treat, the favorable terms which saved the Roman army. But the senate refused to ratify the treaty, and had resolved to send back Mancinus and all his officers, when Tiberius interfered and saved the officers, the consul alone being given up. At the close of 134 he was elected tribune, and commenced his career as a political agitator. The multitude of slaves brought into Italy by the long and frequent wars had taken the place in agricultural occupations of the original farmers, while the small proprietors, during the protracted terms of military service, had been bought out by the rich. Thus all Italy was owned by a few large proprietors, who employed slave labor almost exclusively in the cultivation of the soil. The city at the same time was crowded with veteran soldiers, many of whom had thus lost their estates and all of whom were needy. Prompted by his own ambition and abetted by his mother and friends, Tiberius from the commencement of his tribuneship talked openly of reviving the Licinian law, by which no man could hold more than 500 *jugera* (about 330 acres) of land, and thus the surplus would become the property of the poor citizens. He framed a modification of the Licinian law (see **AGRARIAN LAWS**), which he proposed to the tribes, and which was firmly resisted by the patricians and the wealthy. Three commissioners were to be appointed to superintend the working of the new law; and crowds hastened to Rome to take sides with Tiberius or the senate. Meanwhile the latter had obtained the veto of M. Octavius Cæcina, the other tribune, and thus each time the law was proposed the proceed-

ings were quashed. Tiberius, incensed at this mode of opposition, exercised his veto on other questions, stopping the public supplies, and the government came to a standstill. It was evident that one or both of the tribunes must retire from office. Gracchus at length put the question to the tribes, and it was voted to eject Octavius, who was dragged from the tribune's chair. The agrarian law was passed immediately, and Tiberius, his brother Caius, and his father-in-law Appius Claudius, were appointed commissioners. Thereupon the senate refused to vote Tiberius more than a denarius and a half (about 20 cents) a day for his expenses as a public officer. At this juncture Attalus, king of Pergamus, died, bequeathing his kingdom and treasures to the Roman people. Gracchus forthwith proposed to divide the treasure among the recipients of land under the new law, and to give the popular assembly, instead of the senate, the management of the kingdom. He was formally accused of aspiring to be king, and made a lame defence before the people. Seeing his popularity waning, he sought to be elected tribune for a second term; and this being demurred to as illegal, a whole day's discussion ensued. Next morning, learning that the senate would oppose his election by force, he armed his followers, and was proceeding to clear the capitol when Scipio Nasica at the head of the senators attacked his partisans, and slew 300 of them, as well as Tiberius himself. **II. Caius Sempronius**, brother of the preceding, born about 159 B. C., died in 121. At the death of Tiberius he was left with Appius Claudius as commissioner for carrying out the agrarian law, but abstained from taking any part in politics for several years. In 124 he returned to Rome from Sardinia, where he had been consul's quaestor under L. Aurelius Orestes, was immediately summoned before the censors to give an account of his administration, defended himself successfully, and became a candidate for the tribuneship. He was elected, and commenced by having a law passed aimed at Popilius, who had persecuted his brother's friends. Popilius fled from Rome, and was banished from Italy. Next came a poor-law, by which a monthly distribution of grain was to be made to the people at an almost nominal price. After this he transferred the judicial power in a very great measure to the knights. These measures gained him great popularity. During his second tribuneship (122) he proposed the extension of the Roman franchise to all Italy. But this ultimately led to his ruin. M. Livius Drusus, his colleague, was persuaded by the senate to veto this law, which he did with the applause of the tribes. Furthermore, Drusus outbid him again in the popular favor by offering to establish at once twelve colonies of 3,000 persons each, who were to have their allotments free. Gracchus having seconded a parallel proposition, made by the tribune Rabinus, to colonize a spot near Carthage, the

senate sent him thither as commissioner. When he returned his popularity was gone. In the next election for tribunes his name was omitted. The law founding the colony near Carthage had been unpopular, and soon after his return it was proposed to repeal it. This he resisted, uniting with Fulvius, a commissioner of the agrarian law, and inciting the populace to acts of violence. In the tumult one of the opposite party was slain by a follower of Gracchus, and the senate named the consul Opimius dictator. He summoned Gracchus and Fulvius to answer the charge of murder. Gracchus submitted, but his partisans were in arms, and a conflict ensued. He had crossed the Tiber and taken refuge in a grove of the Furies, where, hard pressed by his enemies, he commanded his servant to slay him. He is represented as a man of surpassing eloquence.

GRACES, *The* (Lat. *Gratie*, Gr. *Χάρες*), mythological beings, generally described as daughters of Jupiter, but called by some daughters of Apollo, and by others of Bacchus; their maternity is still more undecided. The Spartans and Athenians recognized only two Charites, but Hesiod enumerates three, whom he names Euphrosyne, Aglaia, and Thalia; and this number and nomenclature generally prevailed. The Graces were the goddesses of social festivity, happiness, and mirth, the inspirers of those virtues and amenities which render human intercourse delightful, and the patronesses of whatever is graceful and beautiful in nature or in art. Great poets, painters, and sculptors were the peculiar objects of their favor. The Graces were commonly represented as the companions of other divinities, especially Apollo, Venus, and Cupid; and their attributes are made always to harmonize with those of the deity upon whom they attend. Thus as the companions of Apollo they bear musical instruments, while as those of Venus they carry myrtle, roses, or dice. They are usually represented as virgins in the bloom of life, embracing each other, and sometimes appear clothed, sometimes naked.

GRACIAS, or *Gracias á Dios* ("Thanks to God"), an inland city of Honduras, capital of a department of the same name, situated in a fertile plain, near the foot of a steep and craggy mountain, 77 m. W. by N. of Comayagua; lat. 14° 30' N., lon. 88° 50' W. Though now having only 3,000 inhabitants, Gracias was once a flourishing city, with a large population, attracted thither by the rich mines of the surrounding country, and was the chief entrepot for merchandise *in transitu* from Puerto Caballos to the populous region of Guatemala. It was founded in 1530 by Gabriel de Rojas, and enlarged in 1536 by Gonzalo (or more probably Pedro) de Alvarado. Until 1544 it was the seat of government of Guatemala and Nicaragua; but since then it has gradually fallen from its original splendor, the only traces of which are now visible in the parish church and the convent of La Merced. Although mi-

ning is still followed to a considerable extent, and opals of the finest quality are found in the vicinity, the inhabitants depend chiefly on agriculture for subsistence. The climate is very salubrious. Near the town a mountain torrent, one of the tributaries of the Rio Santiago or Venta, plunges by two successive leaps to a depth of 1,200 feet.

GRACIAS Á DIOS, *Cape*, the N. E. point of Central America, at the mouth of the large river Coco or Segovia, in lat. 15° N., lon. 83° 12' W. It was so named by Columbus, when, in his fourth voyage, after beating for many days against head winds and adverse currents, he finally succeeded in turning the angle of the continent, and taking his course southward. There is a harbor near the cape, with but 16 feet of water.

GRACIOSA, one of the Azores, so called from its beautiful situation and extreme productiveness, lat. 39° 5' N., lon. 28° 4' W.; area, 32 sq. m.; pop. about 12,000. Its chief exports are corn, wine, brandy, fruit, hemp, and flax. Chief town, Santa Cruz.

GRADUATION, the art of dividing astronomical, geodetical, and other mathematical instruments. It was formerly done by hand with ordinary dividing instruments, and so few makers possessed the requisite skill that it was very difficult to procure good instruments for the ordinary purposes of navigation; but now the operation is performed with great exactness by machines called dividing engines. Jesse Ramsden, a cloth presser, who subsequently turned his attention to engraving, being brought in contact with mathematical instrument makers, was led to construct the engine which for many years was called by his name. At that time it was considered so valuable that the English commissioners of longitude entered into a contract with him (1775) to instruct a certain number of persons, not exceeding ten, in the method of making and using it, and to divide sextants and octants at certain prices as long as the engine remained in his possession, they becoming the purchasers for the sum of £315, and giving £300 in addition for the invention. Perfect as the instrument was then considered, it has since been greatly improved, so that it is now automatic, the whole operation of dividing a circle, after it has been placed on the engine, being performed by a motion given by the descent of a weight, or by a crank turned by hand. The engine consists of a large wheel of bell metal, the circumference being ratched into 720, 1,080, 1,440, 2,160, or 4,320 teeth, or any number which, divided by 2, 3, 4, 6, or 12, will give 360. These teeth are cut with great accuracy, and the wheel is turned on its centre by an endless screw, by which it may be moved any number of degrees or parts desired. The dividing point is fixed in a frame which admits of a free and easy motion to and from the centre. In England, Troughton, Simms, Thomas, Jones, Ross, and a few others, have been successful in making these engines,

while many others have failed. On the continent of Europe they were first made automatic, and other improvements were also made in them. Gambey of Paris has so arranged his as to divide an instrument without any eccentricity, even when placed in a slightly eccentric position on the engine. Oertling of Berlin has an arrangement for correcting any original errors in the teeth while dividing, and other mechanists of celebrity have constructed them to suit their own views, and for their own use. In the United States there is a large one belonging to the coast survey, made by Simms of London, and afterward made automatic by Saxton; also one in Philadelphia made by Young, and one in New York by the Messrs. Blunt, both of which are automatic. There is no branch of the mechanic arts which requires more skill in the use of tools, more geometrical knowledge, and greater patience, than the construction of a circular dividing engine. The large astronomical instruments are divided in a different manner, and, unless placed on a large engine from which the divisions may be in a manner copied, are original divisions. Troughton, Simms, and Jones of London have used movable microscopes with micrometers; while others on the continent of Europe have availed themselves of the feeling lever, a powerful instrument for that purpose invented by the astronomer Bessel. Straight line divisions for scales, &c., are made by means of a screw, a milled roller, or a wedge which is employed to move a platform sliding freely beneath a cutting frame, and carrying the scale to be divided. In the use of the screw much depends on its accuracy, and, with regard to the roller or wedge, on the working or manner of applying them. When great accuracy is required, the divisions are tested by means of two microscopes, and an error can be detected of $\frac{1}{100,000}$ of an inch. The ruling machines used by engravers in this country are well calculated for this purpose.

GRÆVIUS, Johann Georg (GRÆFFE), a German scholar, born in Naumburg, Jan. 29, 1632, died in Utrecht, Jan. 11, 1703. He had begun to study law at Leipsic, when, meeting with Gronovius at Deventer, he determined to begin his education over again, devoting himself to belles-lettres. After remaining two years at Deventer, he passed to Amsterdam, where he studied history under Morus and Blondel, and abjured Lutheranism for Calvinism. In 1658 he succeeded Gronovius in the atheneum of Deventer, and in 1661 obtained the chair of eloquence in the academy of Utrecht, to which was attached in 1667 that of politics and history. Louis XIV. gave him a pension, and the universities of Heidelberg, Leyden, and Padua in vain sought to attach him to them. Among his works are editions of Hesiod, Cicero, Catullus, Tibullus, Propertius, Suetonius, and Florus, and *Thesauri* of Italian antiquities.

GRÄFE. I. Karl Ferdinand von, a German surgeon, born in Warsaw, March 8, 1787, died in

Hanover, July 4, 1840. He graduated as a doctor of medicine at Leipsic in 1807, and in 1811 became professor of surgery in Berlin. During the war with Napoleon he superintended the military hospitals, and after the restoration of peace (1815) he became a member of the medical staff of the army. Students from all parts of the world attended his lectures, and on his visit to England he was the guest of the king. In Paris Dupuytren invited him to take his place as a lecturer. In 1840 he was summoned to Hanover to operate upon the eyes of the crown prince (the present ex-king George), but he suddenly died after his arrival there. The revival of the rhinoplastic process was due in a great measure to the labors of Gräfe, who propounded his system in his work *Rhinoplastik* (Berlin, 1818).

II. Albrecht von, a German oculist, son of the preceding, born in Berlin in May, 1828, died there, July 18, 1870. He studied mathematics and the natural sciences, and afterward medicine, at Berlin, Prague, Vienna, and Paris, devoting himself particularly to ophthalmology, and founded in Berlin a private establishment for the treatment of the eyes. He was also professor of ophthalmology in the university. He was distinguished for great practical and scientific acquirements in ophthalmology, the leading journal of this department of medicine at Berlin, *Von Gräfe's Archiv für Ophthalmologie*, being conducted under his name with the collaboration of Profs. F. Arlt, F. C. Donders, and Th. Leber. Most of Von Gräfe's important contributions were published in this journal. These were papers on the "Physiology and Pathology of the Oblique Muscles of the Eyeball," on "Double Vision after Operations for Strabismus," on "Diphtheritic Conjunctivitis," on the "Effect of the most refrangible Solar Rays upon Sensation," on the "Treatment of Glaucoma by Iridectomy," on the "Cerebral Causes of Blindness," and on a modified form of the operation for the extraction of cataract. He was also a frequent contributor to the medical society of Berlin and to various medical journals. **III. Alfred Karl**, nephew and some time assistant of the preceding, born Nov. 23, 1830. In 1858 he graduated at Halle, afterward became professor there, and founded an ophthalmic institute, which is visited by several thousand patients annually. He was the first to obtain a recognition of the study of diseases of the eyes as a special science in the Prussian universities. He has published *Klinische Analyse der Motilitätsstörungen des Auges* (Berlin, 1858), *Symptomenlehre der Augenmuskellähmungen* (1867), and *Ein Wort zur Erinnerung an Albrecht von Gräfe* (1870).

GRÄFENBERG. See PRIESSNITZ.

GRAFTING, the process in horticulture by which a portion of a plant is made to unite with another plant, whether of the same kind or of another variety or species. The plant upon which the operation is performed is called the stock; the portion inserted in or joined

with it the scion or graft. No attempts toward grafting plants on others which do not belong to the same natural order have been successful. Generally speaking, varieties succeed best on varieties, species on species, or species and varieties on allied genera. All our cultivated fruits, for instance, are improved varieties of some original species. Out of thousands of varieties raised from the seeds of some previous excellent variety, it is not likely that any will be precisely like the immediate parent; some few may be equal or superior to it, but the great majority will be inferior. When a new and decidedly valuable variety occurs, it becomes a matter of importance to perpetuate it in as many individual plants as possible, and this, with trees, is usually done by grafting. The trifling effect that the stock has upon the scion enables the poorer varieties to be employed in furnishing the trunk and root to the smaller and younger scion. A piece of well ripened wood, in the form of a twig of the growth of the previous season having three or four buds upon it, is thus transferred to the poorer kind, and forms a living extremity, which extends itself into branches and forms a new head or top. Fruit trees are grafted on plants of their own kind, called free stocks, or they are grafted upon a related variety or species to accomplish some particular end. Certain stocks induce early fruiting and a dwarfed growth; to dwarf the apple, it is grafted upon the paradise, a distinct variety of apple; the pear is dwarfed by grafting upon the quince. A species of cherry called the mahaleb (*prunus mahaleb*) is used for dwarfing the cherry, and the sloe and the beach plum for the plum. The peach upon its own roots does not grow well in stiff and cold soils, and for such situations it is worked upon a plum stock. The pear will grow when grafted upon the apple, but the union is short-lived; it is also sometimes grafted upon the thorn and mountain ash, but such unions are a matter of fancy rather than utility; nurserymen use only the stocks we have mentioned. The raising of stocks is an important part of the nurseryman's business; though a tree may be grafted at almost any age, in nurseries where hundreds of thousands are worked every year the stocks used are as small as practicable. Free stocks for the apple and pear are raised from seeds, while the dwarfing paradise and quince stocks are grown from layers and cuttings. Most of the grafting in nurseries is done indoors in the winter. The stocks, which are a quarter of an inch or more in diameter, are taken up in the autumn and buried in an accessible place; when worked, the root is shortened, the top cut off, and the scion inserted at the "collar," or where root and stem join. The grafted roots are set in boxes of sand and kept in a cellar until they can be planted in spring. The operation is performed with great rapidity, and several mechanical appliances have been devised for facilitating the work. Sometimes pieces of the root

are used as stocks, but there has been much discussion and great difference of opinion as to the value of the trees so produced. Stone fruits are more difficult to graft than the apple and pear, but if it be done sufficiently early in spring the plum may be so treated very successfully; the peach is rarely grafted at the north, but it succeeds at the south; this fruit is usually propagated by that form of grafting called budding. Although fruit trees are grafted with scions of ripened wood, there are some trees which will only succeed when green wood is used for both scion and stock; this kind of grafting is called herbaceous. Many evergreens can be grafted in the ordinary way, but the pines only succeed with herbaceous grafting, and the same may be said of some nut-bearing trees. Ornamental trees of various kinds are propagated by grafting, especially where it is desired to perpetuate some individual peculiarity, such as a pendent or weeping habit, or foliage of an unusual shape or color. Some weeping trees which are naturally low, as the weeping beech, ash, and poplar, form elegant specimens when grafted upon a stock 8 or 10 ft. high. Among ornamental trees and shrubs grafting is resorted to as the most rapid means of propagation: sometimes a variety cannot be multiplied readily from cuttings, but can be grafted upon some related stock that will grow rapidly. The choicer species of clematis, now so much prized as ornamental climbers, take root with great difficulty, while some of the older kinds strike root freely; the florist grows these from cuttings, and grafts the more difficult subjects upon their roots. The fine double camellias will not grow from cuttings, but are propagated by grafting upon the single kinds which readily do so. Epiphyllums and other trailing cactuses make fine plants by grafting them upon a stout stem of *cereus triangularis* or one of the pereskias. Successful grafting of the apple upon the maple, the rose upon the black currant, and the like, is impossible, although instances of it are often narrated. The utility of the operation of grafting depends upon the fact that a bud is the representative of the tree from which it is taken; it has the possibility of unlimited development; and as it will, if allowed to extend into a branch on the tree where it has formed, repeat all the characters of the tree, so when taken from the tree which produced it and planted as it were in the substance of another tree, it will develop a branch like the parent tree, and not like the stock with which it is united. Between the wood and bark of exogenous trees, including all northern fruit trees, there is a layer in which the forces of vegetation are most active; here the wood of the tree receives each year a layer of new wood, outside of the old, and the inner bark has deposited upon it a new layer upon the inside of that of previous years. This portion, which is neither perfect wood nor bark, but the place where both are

being formed, is called the *cambium* layer. It is this which, if a cut be made in a tree, sends out a new growth to close over and repair the wound; and it is upon the extraordinary vitality of this cambium that the success of grafting depends. The mechanical operations of grafting are various, but they all have for their object the bringing of the newly forming wood and bark of the scion into the closest possible contact with those of the stock. As a general rule, grafting is most successful when the scions are quite dormant, but the forces of vegetation in the stock are active. Fruit-tree scions are cut at any time after the fall of the leaf before the buds begin to swell, and kept in damp sand or saw dust to prevent drying.—Cleft grafting is in this country the most common and likewise the most clumsy method, and yet very often the most successful. It is practised upon stocks from an inch to several inches in diameter. The branches of old trees are renewed by this method, the grafts being inserted in the branches. Sometimes the entire tree of four or five inches diameter is cut to a bare stock and used in the same manner. The stock, whether trunk or branch, is cut over horizontally with a sharp saw, and the surface pared smooth with a knife; a cleft about two inches deep is made in the stock with a grafting knife and mallet; the scion to be grafted is prepared by sloping its lower end in the form of a wedge about an inch and a half long, leaving it a little thicker on the outer edge. The cleft being kept open with a wedge, the scion is carefully

loam and cow dung, or with grafting wax, to exclude the air and to facilitate the union. Until a few years ago clay and loam were exclusively used, but grafting wax is neater and more effective. Various compositions are in use; they consist of resin and wax melted to-



Fig. 2.—Whip Grafting, showing the tongues prepared and after-ward bound together.



Fig. 3.—Whip Grafting on the Collar.

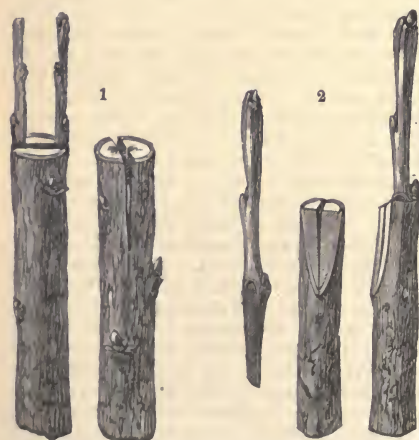


Fig. 1.—Cleft Grafting.

1. The operation with the stock cut horizontally. 2. With a sloping cut.

pushed down to the place fitting its inner bark on one side, so that the inner edges of the bark of stock and scion may coincide. The wedge is then withdrawn, and the scions are retained in place by the springing together of the cleft, when the graft is covered with a mixture of

gether, with lard or linseed oil, and should be of such consistency as to remain plastic in cool weather, yet not run in hot weather. It is best applied by means of strips of well worn muslin or calico saturated with the composition. For root grafts, well waxed cotton twine, or paper waxed on one side, may be used. Where the stock is large two scions are put in on opposite sides, but with small stocks only one is used, and the stock at the side opposite to the scion is cut in a sloping manner to facilitate healing.—Another process, called whip or tongue grafting, is considered the most expeditious. The stock upon which it is performed must be slender, from the size of a goose quill to any diameter which coincides with the thickness of the graft. Some smooth, clear part of the stock being selected, it is sloped on one side with a knife to a very acute angle. A scion having two or more buds, and of the size to match the stock, is cut with a slope to correspond with that upon the stock; then upon each slope or cut surface is cut a tongue; the scion and stock are locked together by means of these tongues in a manner that will be understood by an examination of the engraving. The barks of both being made to correspond, a piece of waxed cloth or waxed twine is wound round them to hold them in place. After the graft pushes its buds, the binding should be loosened and finally removed, when the adhesion is completed. This method is used in root grafting, and may be practised also on flowering shrubs.—In saddle grafting, the scion is cleft instead of the stock; the stock is pared away on each side to an acute angle, so as to allow the scion to sit or ride

upon it, and the union of the edges of the barks made as complete as possible on each side.—Crown grafting is by many preferred to cleft grafting, as there is no split made in the stock, which often leads to decay; it is practised upon large trees of which the wood is too hard and stubborn to be cleft, or upon small stocks. Several scions are pared away on one side of the lower end for about two inches, so as to make that side flat and leave a shoulder forming a right angle with it. The head of the stock being sawn off horizontally, and the cut portion smoothed, the bark is gently raised from the wood and thin wedges inserted. The scions are now pushed under the bark, their shoulders resting on the crown of the stock; the wedges being withdrawn, the whole is covered with wax or waxed cloth. After the grafts have grown, and made long, tender shoots, which they will be apt to do with much rapidity and vigor, they should be secured to long stakes planted near the stock and rising above it, to

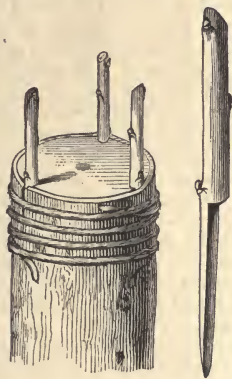


FIG. 4.—Crown Grafting, showing the completed operation and an enlarged view of the scion.

prevent the wind from breaking off the newly formed top at the junction with the stock; or where the grafts are in the head of a tree, their vigor is controlled by pinching.—Sometimes it is essential to replace limbs that have been broken from young trees, or from branches of older ones, and to restore the symmetry of form; and this is done by side grafting. Here the bark and a little of the wood is sloped off from the side of the trunk or of the branch, and the lower end of the scion is cut so as to fit the part as near as possible; it is then fixed in the branch or trunk, first tonguing both as in whip grafting, tying them with bast, and claying or waxing over. Another form of side grafting is used on the camellia and other hard-wooded shrubs; a long, nearly perpendicular cut is made in the stem, in which the scion is placed.—Inarching is only a kind of grafting, and is employed where the cut scion is not easily united to the desired stock. Two branches, or two stocks of the

two distinct plants, are brought close together, and the prepared surfaces are matched and tongued, as in whip grafting; after a while a perfect union will take place, when the inarched portion is to be separated from its parent root, and it henceforth becomes the branch or top of its new foster mother. The two plants to be inarched must be brought near to one another, which is usually accomplished by having one of them in a pot. In some cases the same object is effected by placing the lower end of the branch to be inarched in a bottle, which is kept supplied with water.—Budding is only a variety of grafting in which a single bud is used instead of a scion with several; it is also called shield grafting. (See BUD-DING.)—The practice of grafting seems to have been long known; but the processes have multiplied with the discoveries and improvements in horticulture, and others besides those mentioned here are employed for particular subjects. A full account of all the processes known will be found in *L'Art de greffer*, by Baltet. Du Breuil's "Arboriculture," Barry's "Fruit Garden," and Thomas's "Fruit Culturist" may also be consulted for practical details.



FIG. 5.—Inarching.

GRAFTON, a W. county of New Hampshire, bounded W. by the Connecticut river; area, 1,463 sq. m.; pop. in 1870, 39,103. It has a mountainous surface, containing some of the celebrated summits of the White mountains and the Franconia range. Much of the land is devoted to pasturage, but parts of it are susceptible of high cultivation. The Northern (N. H.) and its Bristol branch, the White Mountain, and the Boston, Concord, and Montreal railroads pass through the county. The chief productions in 1870 were 57,802 bushels of wheat, 198,165 of Indian corn, 390,172 of oats, 1,078,208 of potatoes, 1,095,623 lbs. of butter, 189,602 of cheese, 446,197 of wool, 650,445 of maple sugar, 26,377 of hops, and 140,220 tons of hay. There were 7,135 horses, 12,748 milch cows, 6,685 working oxen, 14,562 other cattle, 86,681 sheep, and 4,302 swine. The number of manufactories was 646, with an aggregate capital of \$2,362,735; value of products, \$5,012,033. The most important were 5 of agricultural implements, 15 of clothing, 1

of elastic sponge, 7 of furniture, 14 of gloves and mittens, 5 of hosiery, 3 of iron castings, 11 of dressed skins, 8 of paper, 4 of shoe pegs, 25 of starch, 6 of woollen goods, 69 saw mills, 10 tanneries, 5 currying establishments, and 6 flour mills. Capital, Haverhill.

GRAFTON, a town of Worcester co., Massachusetts, on the Blackstone and Quinsigamond rivers, and on the Blackstone canal and the Boston and Albany and Providence and Worcester railroads, 38 m. S. W. of Boston; pop. in 1870, 4,594. It comprises several villages, and is extensively engaged in manufacturing, the canal and rivers furnishing water power. There are 8 cotton mills, with 30,170 spindles, several currying establishments, and extensive boot and shoe factories. The town has also mica quarries, two national banks, 18 public schools, including a high school, and seven churches.

GRAGNANO, a town of S. Italy, in the province of Naples, at the foot of Monte Pendolo, 19 m. S. E. of Naples; pop. about 10,000. It is the seat of a bishop, and has manufactures of macaroni and a considerable trade in wine.

GRAHAM. I. An extreme W. county of North Carolina, formed since the census of 1870 from Cherokee co., bounded N. E. by the Tennessee river, and separated from Tennessee by the Iron mountains; area, about 300 sq. m. The surface is mountainous; the soil of the valleys is fertile. Capital, Fort Montgomery. **II.** A N. W. unsettled county of Kansas; area, 900 sq. m. It is intersected by the South fork of Solomon river, and drained by Saline river.

GRAHAM, Isabella, a Scottish philanthropist, born in Lanarkshire, July 29, 1742, died in New York, July 27, 1814. Her maiden name was Marshall. In 1765 she married Dr. John Graham, an army surgeon, and went with him to Canada and to Antigua, where he died in 1774. Returning to Scotland, she taught school in Paisley and in Edinburgh. In 1789 she came to New York, and established a seminary for young ladies. Before leaving Scotland she originated the "Penny Society," now known as the "Society for the Relief of the Destitute Sick;" and through her efforts in part or entirely, the "Society for the Relief of Poor Widows," the "Orphan Asylum Society," the "Society for Promoting Industry among the Poor," and the first "Sunday School for Ignorant Adults," were established in New York. She aided also in organizing the first missionary society and the first monthly missionary prayer meeting in the city; was the first president of the Magdalen society; systematically visited the inmates of the hospital, and the sick female convicts in the state prison; and to hundreds of families distributed Bibles, as well as tracts prepared under her own direction. Her memoirs were written by Dr. Mason (8vo, 1816), and her letters and correspondence, selected by her daughter, Mrs. Bethune, were published in New York in 1838.

GRAHAM, John, Viscount Dundee and Lord Graham of Claverhouse (by which latter title

he is most generally known), a Scottish soldier, born near Dundee in 1643, killed at the battle of Killiecrankie, July 17, 1689. Educated at the university of St. Andrews, he served both the French and the Dutch as a soldier of fortune from about 1670 to 1677, when he returned to England. Letters of recommendation from the prince of Orange to Charles II. caused him to be appointed captain of one of the troops of dragoons which the king was sending into the western lowlands to force the Covenanters to comply with the established religion. His own merciless severity was so well seconded by his troopers, that his name is held in lasting execration. Defeated at Drumclog by the exasperated Covenanters, he took a fearful revenge at Bothwell bridge, and continued his atrocities through the western shires. Ennobled in November, 1688, by James II., he ardently espoused the king's cause against the prince of Orange, attended the parliament convened in Edinburgh to arrange the succession to the crown, and, becoming alarmed for his personal safety, fled from the city with a squadron of horse. Several disaffected clans and a body of Irish joined him. At the pass of Killiecrankie he routed the troops of William III., and fell by a chance shot in the moment of victory. His qualities as a soldier and a politician, which were conspicuously displayed during the last few months of his life, have diverted attention somewhat from his crimes; and Sir Walter Scott, in his "Old Mortality," has presented a vigorous though highly colored picture of him. One of the latest attempts to relieve his character from the odium which attaches to it was made by Prof. Aytoun in the appendix to his "Lays of the Scottish Cavaliers." See also "Memorials and Letters illustrative of the Life and Times of John Graham of Claverhouse, Viscount Dundee, by Mark Napier" (3 vols., Edinburgh, 1859-'62).

GRAHAM, Sylvester, an American reformer, born in Suffield, Conn., in 1794, died in Northampton, Mass., Sept. 11, 1851. Almost from childhood he was dyspeptic and rheumatic, and having tried successively farm labor, paper making, travelling with a horse dealer, shop-keeping, and teaching, was driven from them all by feeble health and symptoms of consumption. In 1823 he entered Amherst college to prepare for the ministry. There the fervor of his elocution was ridiculed as theatrical, and this almost determined him to seek some other profession; but in 1826 he married, and soon after became a Presbyterian preacher. In 1830 the Pennsylvania temperance society engaged him as a lecturer, and he took up the study of physiology and anatomy, from which he was convinced that the only permanent cure for intemperance was to be found in correct habits of living and judicious diet. This idea, which he extended to the cure of diseases generally, was set forth in his "Essay on Cholera" (1832),

and in a course of lectures which he delivered at various places and published under the title "Graham Lectures of the Science of Human Life" (2 vols., Boston, 1839). He also published a "Lecture to Young Men on Chastity," which made a great sensation, and a treatise on "Bread and Bread Making." Bread made from unbolted flour still bears his name. A few years before his death he began a "Philosophy of Sacred History," intended to show the harmony between Scriptural teachings and his views on dietetics; he finished only one volume of it, which was published posthumously.

GRAHAM, Thomas, a Scottish chemist, born in Glasgow, Dec. 20, 1805, died in London, Sept. 15, 1869. He studied at the universities of Glasgow and Edinburgh, and after graduating opened a laboratory in Glasgow and lectured on chemistry at the mechanics' institute. He was professor at the Andersonian university in Glasgow from 1830 to 1837, and at the university college in London from 1837 to 1855. Having, as a non-resident assayer, submitted all the specie in the mint to a uniform scientific standard, he became, in February, 1855, Sir John Herschel's successor as master of the mint, and held this office till his death. He was one of the founders and the first president of the chemical society of London, for many years president of the Cavendish society, and a fellow and twice vice president of the royal society, which gave him many medals. He conducted many physical and chemical investigations for the government, including one of especial interest on the effect of hail storms in the Newcastle coal mines, reporting on the ventilation of the houses of parliament, and in 1851, with Professors Miller and Hoffmann, on the quality of the metropolitan water supply. He discovered the law of diffusion of gases and the polybasic character of phosphoric acid; demonstrated the existence of a diffusive power in liquids resembling that in gases, to which he applied the name of *omosis*, and determined its relation to *endosmosis* and *exosmosis*; expounded new theories on the composition of salts, and extended his researches to the transpirability of gases. His discoveries and other labors are embraced in his "Elements of Chemistry" (London, 1842), edited with notes and additions by Dr. Robert Bridges (Philadelphia, 1852; new eds., 2 vols., London, 1856-'58, and 1865; German translation by Otto, 3d ed., Brunswick, 1857). He contributed important papers to the "Philosophical Transactions," and the annals of the chemical and other scientific societies. His genius is highly appreciated in Germany, and A. W. Hoffmann published in Berlin (1870) his *Gedächtnissrede auf Thomas Graham*. A bronze statue of Graham was placed in George square, Glasgow, in 1872.

GRAHAM, William Alexander, an American statesman, born in Lincoln co., N. C., Sept. 5, 1804. He was educated to the law, and in 1833 entered public life as a member of

the lower branch of the state legislature, of which he was several times elected speaker. He represented North Carolina in the United States senate between 1841 and 1843, and was governor of the state from January, 1845, to January, 1849. On the accession of Mr. Fillmore to the presidency he was appointed secretary of the navy, an office which he filled until June, 1852, when, receiving from the whig national convention the nomination for vice president, he resigned the secretaryship. During the last year of the civil war he was a senator in the confederate congress, and in 1866 he was a delegate to the union convention in Philadelphia.

GRAHAM ISLAND, or *Ile of Julia*, a volcanic island, which appeared in the Mediterranean in July, 1831, and disappeared toward the close of October. The locality was about midway between Sciacca in Sicily and the island of Pantellaria, lat. 37° 8' N., lon. 12° 42' E. The depth of water had been found, a few years before, to exceed 100 fathoms. An earthquake shock was felt over the spot three weeks before the appearance of the island; and on July 10, a few days before land was observed, a waterspout was seen by a Sicilian navigator, which was succeeded by an immense column of steam rising to the estimated height of 1,800 feet. Fire was seen on the 17th by the master of the brig *Adelaide* of London. On the 18th the Sicilian captain, repassing the spot, found a small island, 12 ft. out of water, with a crater in its centre, ejecting volcanic matter and immense columns of vapor. About the same time Commander Swinburne, R. N., reported it to be 70 or 80 yards in external diameter, and its lip as thin as it could be consistent with its height, which might be 20 ft. above the sea at the highest point. On July 23, as reported and sketched by Mr. Russell of H. M. ship *St. Vincent*, the circumference of the island was three fourths of a mile, and its highest point 80 ft. above the water. At that time columns of water were ejected to the height of 800 to 1,000 ft., and scoriæ were thrown, it was supposed, twice as high. The first landing was effected on Aug. 3, by Capt. Senhouse of the *St. Vincent*, who hoisted the British flag, and called the island by the name which was afterward adopted by the royal and geographical societies. The island was then from 1½ to 1¾ m. in circumference, and its highest point was about 180 ft. above the surface. A deep circular crater lay between two longitudinal hills, by which it was entirely shut in except for about 250 yards on its S. E. side, where a bank only 3 ft. high separated it from the sea. The crater was filled with boiling salt water of a dingy red color, from which rose a nauseous and oppressive vapor. The only gas evolved in large quantity was carbonic acid. Some authorities have made it about this time to be 3 m. in circumference, with a maximum height exceeding 200 ft. On Aug. 25 it was reduced to 2 m., and on Sept. 3 to

only 1 m., with a maximum height of 107 ft. The crater was then 780 yards in circumference. The materials which composed the island were scoria, pumice, and lapilli, arranged in regular strata which sloped steeply away from the crater. The only substances found not of volcanic nature were fragments of dolomitic limestone. No lava was ever seen to flow, and no solid beds were formed which could resist the action of the waves. By these all the loose materials were washed away, so that at the close of October it may be said to have entirely disappeared. Two years afterward Capt. Swinburne found a dangerous reef at the spot, in the centre of which was a black rock of the diameter of 26 fathoms, from 9 to 11 ft. under water. Around it, extending 60 fathoms to deep water, were banks of black volcanic stones and loose sand. The black rock in the centre was supposed by Lyell to be solid lava which rose in the crater and became solidified and formed a dike. Another shoal 450 ft. S. W. of the great reef marked the spot where another outbreak of boiling water and steam had been observed in the month of August, 1831. In July, 1863, the island reappeared, and in a few weeks rose to the height of 200 or 260 ft.; but it was soon demolished by the wash of the waves. The volcano had appeared once or twice previous to 1831. It is said that a smoking island existed in this spot about the year 1801, and the shoal is marked in old charts. This island has been called by seven names, and is sometimes still known as *Ferdinandeia*.

GRAHAME, James, a Scottish poet, born in Glasgow, April 22, 1765, died near that city, Nov. 30, 1811. He was educated at the university of Glasgow, went to Edinburgh, and became a writer to the signet in 1791, and a member of the faculty of advocates in 1795. But the legal profession had always been distasteful to him, and in the spring of 1809 he went to England, where he was ordained a minister of the established church, and became curate of Shipton, Gloucestershire, and afterward of Sedgfield, in Durham. His principal poetical works are "The Sabbath," "Mary, Queen of Scots," "British Georgics," and "The Birds of Scotland."

GRAHAME, James, a Scottish historian, born in Glasgow, Dec. 21, 1790, died in London, July 3, 1842. He studied at St. John's college, Cambridge, but soon terminated his connection with that institution, and after preparatory studies was admitted an advocate at the Scottish bar in 1812. For nearly 14 years he practised his profession, until he was obliged through ill health to seek a more genial climate. Settling in the south of England in the spring of 1826, he devoted himself to the preparation of a history of the United States. His early education, his religious views, which were those professed by the Scotch Covenanters and Puritans, and his zeal in the cause of civil liberty, combined to render the subject

attractive to him. In 1827 the first two volumes were published, and in 1836 a new edition appeared in 4 vols. 8vo, bringing the history down to the year 1776. The thoroughly American spirit in which the work was written interfered with its success in England, and for several years it attracted little notice in the United States; but in 1839 the author received from Harvard college the degree of LL. D., and in 1841 an article on his history by Prescott appeared in the "North American Review." Four years later an edition of his work was published at Philadelphia in 4 vols. 8vo, succeeded in 1846 and 1848 by editions in 2 vols. each, that of 1846 containing a memoir of the author by Josiah Quincy. Mr. Quincy also published a work entitled "The Memory of the late James Grahame, the Historian of the United States, vindicated from the Charges of Mr. Bancroft" (8vo, Boston, 1846). In 1837 Mr. Grahame, who for some years previous had resided at Nantes, France, began to collect materials for continuing his history, but was compelled by ill health toward the close of the year to abstain from literary labor of all kinds. His last work was a pamphlet entitled, "Who is to Blame? or Cursory Review of the American Apology for American Accession to Negro Slavery" (London, 1842). The subject had excited his attention for many years, and he had testified his sincerity by joining with his children in liberating a number of slaves they had jointly inherited from his wife. He wrote pamphlets on various social and religious questions, including a "Defence of the Scottish Presbyterians and Covenanters against the Author of the 'Tales of my Landlord';" but the absorbing study of the best years of his life was American history. He delighted to call himself an American by adoption, and declared that his daughter was "hardly dearer to him than America and American renown." His "History of the United States" is written, according to Chancellor Kent, "with great gravity and dignity, moderation and justice."

GRAHAM'S TOWN, a town of Cape Colony, capital of the district of Albany, 22 m. N. N. W. of Bathurst, and 465 m. E. by N. of Cape Town; pop. about 8,000. It is pleasantly situated on an eminence surrounded by high grassy hills. The streets are wide; the dwellings provided with gardens well watered and stocked with fruit trees. There are several handsome churches, a public library, two banks, and a flourishing grammar school. It is the see of an Anglican and a Roman Catholic bishop.

GRAIL, Holy. See **GRAAL**.

GRAIN (Lat. *granum*, a seed), the smallest measure of weight in use, about equal to that of a kernel of wheat. A statute passed in England in 1266 ordained that 32 grains of wheat, taken from the middle of the ear and well dried, should make a pennyweight, 20 of which should make an ounce, 12 of which should make a pound. The pound, therefore, consisted then of 7,680 grains, but afterward of only 5,760, in

consequence of the division of the pennyweight into 24 grains. The present troy pound is 5,760 grains, and the avoirdupois pound 7,000.

GRAIN COAST, a part of the coast of upper Guinea, W. Africa, between Capes Mesurado and Palmas, comprising a large part of the coast of Liberia. It receives its name from the cardamom, or grain of paradise, called otherwise Guinea grains and Malagueta pepper, which is exported. (See **LIBERIA**.)

GRAINGER, a N. E. county of Tennessee, bounded N. W. by Clinch river and S. E. by Holston river, here navigable by steamboats; area, about 330 sq. m.; pop. in 1870, 12,421, of whom 1,030 were colored. The surface is hilly, Clinch mountain crossing the county from N. W. to S. E. The river bottoms are fertile, and the highlands are rich in iron and other ores. The chief productions in 1870 were 78,146 bushels of wheat, 353,260 of Indian corn, 86,005 of oats, 12,285 of Irish and 8,045 of sweet potatoes, and 709 tons of hay. There were 2,233 horses, 2,248 milch cows, 4,670 other cattle, 9,797 sheep, and 17,723 swine. Capital, Rutledge.

GRAKLE. I. A conirostral bird of the East Indian genus *gracula* (Linn.), constituting in itself the subfamily *guaculinæ* of the family *sturnina* or starlings. The species, especially the mina bird (*G. religiosa*), are celebrated for their powers of song and speech. (See **MINO BIRD**.)

II. In the United States, the name of birds of the subfamily *quiscalinæ* or boat-tails, which includes the genera *scolecophagus* (Swains.), *quiscalus* (Vieill.), and *scaphidurus* (Swains.). The genus *scolecophagus* has the bill shorter than the head, nearly straight, slender, with the edges inflexed; the wings moderate and pointed, the first quill shorter than the second, third, and fourth, which are longest; the tail shorter than the wings, flat and nearly even; tarsi as long as the middle toe, with broad scutellæ; toes long and slender, the hind toe long, and the slender claws sharp and slightly curved. The rusty grackle (*S. ferrugineus*, Swains.) is about 9 in. long, extent of wings 14 in., bill 1 in., tarsus 1½; the plumage is soft and glossy, of a deep black color, with greenish and bluish reflections; the female is smaller, of a general brownish or rusty black, the feathers beneath margined with brownish; the young resemble the female, with the head, neck, and lower parts lighter brown, and the rump tinged with gray; in the autumn and winter even the males become rather rusty. They are found from the Atlantic coast to the Missouri, migrating to the far north in the spring to breed; in the autumn they return to the south in small flocks with the cow-bunting and red-winged blackbird, with which they associate until spring returns. The flight is quick and undulating, and the walk is graceful, the tail being jerked up and down at every step. They frequent the corn fields and rice plantations, where they do little mischief; they are fond of the com-

pany of cattle, picking out the grain from their droppings; in the winter they resort to marshes and watercourses, feeding on aquatic insects and small mollusks. Their note is a kind of chuck, but during the breeding season they are noisy and have a lively and agreeable song. They are not very shy. The nest is built on low bushes in moist places, of coarse materials, and the eggs, four or five, are light blue, streaked and dashed with lines of brown and deep black. The Mexican grackle (*S. cyanocephalus*, Cab.) is a somewhat larger bird, with a stouter bill, and a purplish gloss confined to the head and neck; it is found from Minnesota to the Pacific, and as far south as Mexico.—The other grakles belong principally to the genus *quiscalus*, characterized by a bill as long as the head, broad, with the edges inflexed, and the tip of the upper mandible overhanging the under; the wings moderate, the second, third, and fourth quills the longest; the tail longer than the wings, graduated and the sides turned upward; the tarsi as long as the middle toe, strong, and greatly scutellated; the toes strong, and the hind one long, all scutellated; claws short, robust, and slightly curved. More than 12 species are described, which migrate according to the seasons; in winter their immense flocks are very destructive on plantations, while in spring they devour from the fields and ploughed lands great numbers of worms, grubs, and caterpillars, injurious to vegetation; they pull the young corn soon after it has sprouted, and also attack it when in the milky state. The species found in the United States are best distinguished by the size and form of the tail. The largest is the great-tailed grackle (*Q. macrourus*, Swains.), 18 in. long, with an extent of wing of about 27, and the tail 9½; the color is shining black, with purple and green reflections, and the feathers of the head soft and velvety; it is found from the valley of the Rio Grande in Texas southward. The boat-tailed grackle, great crow-blackbird, or jackdaw as it is sometimes called (*Q. major*, Vieill.), is about 16 in. long, with an extent of wings of 2 ft.; the color is shining black, the purple gloss being confined to the head, neck, and fore part of the breast, elsewhere with green reflections; the crown feathers are coarse and stiff. Their habits are the same as those of the other grakles; they seek their food among the salt marshes and along the muddy shores, eating fiddler crabs, insects, worms, shrimps, and other aquatic animals; they are fond of the eggs of other birds, and commit depredations in the corn and rice fields. They are very shy, and fly at a considerable elevation and for long distances; the notes are harsh and shrill, though rather pleasing in the love season. The nest is large, of coarse materials, placed on tall reeds growing in the water, on smilax bushes, and on live oaks, where they breed in communities; they begin to lay about the 1st of April, sometimes earlier; the eggs, four or five, are dull white with irregular streaks of brown and black; only one

brood is raised in a season. This species is found in the southern Atlantic and gulf states, near the coast, and in Texas. During the breeding season, the sides of the tail are turned upward, whence its common name has been



Purple Grackle (*Quiscalus versicolor*). 1. Female. 2. Male.

derived. The purple grackle, or common crow-blackbird (*Q. versicolor*, Vieill.), is 13 in. long, with an extent of wings of 19; the head and neck are steel-blue, the rest of the plumage with varied reflections of bronze, golden, green, violet, and copper; the female is smaller, with a less brilliant and more brownish plumage. The habits are the same as in the others of the genus; the friends of the farmer in spring by devouring grubs, in summer and early autumn they dispute the possession of the corn fields with the planters, who seek to frighten or destroy them; their mischief is so great that the corn is sometimes steeped in saline and bitter solutions to prevent it from being pulled up; in cold weather they feed upon beech nuts, acorns, and the refuse of the cattle pens. In the southern states the nest is generally in a hole in a decayed tree; the eggs, four to six, are bluish, with brown and black streaks and blotches; in the north, pine trees are favorite places for their nests. They are found in the Atlantic states, from New England to Florida, and on the high central plains of the continent. The flesh is eatable.—The genus *scaphidurus* has a long bill, with the culmen advancing on the forehead, and sloping to an acute and curved tip; the wings are long and pointed, the first quill the longest; the tail lengthened, graduated, with the sides turned upward. They are found in the West Indies and in South America.

GRAMMAR. See LANGUAGE.

GRAMME, the French unit of weight, equal to 15·4325 grains troy, or very nearly $\frac{1}{16}$ of a dram avoirdupois. It is the weight of a cubic centimetre of distilled water at the temperature of maximum density, 4° C., or 39·2° F.

The gramme is divided, according to the French system, into 10 decigrammes, 100 centigrammes, or 1,000 milligrammes. Its multiples by 10 are successively deca-, hecto-, kilo-, and myriagrammes. The weight of the kilogramme, or 1,000 grammes, is equal to 2·6793 lbs. troy, or 2·2046 lbs. avoirdupois. In rough estimates 50 kilogrammes are often conveniently taken as equivalent to 1 cwt., being only $\frac{1}{4}$ lb. short of this, and 1,000 kilogrammes as 1 ton, the deficiency being only 35·4 lbs.

GRAMONT, an ancient French family, which traces its origin to the 14th century, takes its name from the seignourial estate of Gramont in Lower Navarre, and has produced several distinguished men. **I. Antoine III.**, duke de, distinguished himself in several campaigns during the reigns of Louis XIII. and Louis XIV., became marshal of France in 1641, was commissioned in 1660 to bring from Spain the infanta Maria Theresa as bride of Louis XIV., and died in 1678. He left personal *Mémoires*, which were published by one of his sons. **II. Philibert**, count de, brother of the preceding, born in 1621, died Jan. 10, 1707. His innumerable love affairs, gambling adventures, and intrigues have been handed down to posterity in the sprightly narrative by his brother-in-law, Anthony Hamilton. This hero of fashionable licentiousness, after figuring indifferently in several campaigns, was ordered to leave France in 1662, because he had been presumptuous enough to pay his homage to Mlle. Lamothe Houdancourt, upon whom Louis XIV. had fixed his affections. He then repaired to the court of Charles II. of England, where he became the favorite of many ladies of rank and beauty. He was stopped at last in his career of debauchery by an enforced marriage with Eliza Hamilton. He returned to France with his wife, who was appointed lady in the household of Queen Maria Theresa. He was 80 years old when, to divert him, his brother-in-law undertook the *Mémoires* which were to perpetuate his name. **III. Antoine Agénor Alfred**, duke de, a French diplomatist, born in Paris, Aug. 14, 1819. He commenced his diplomatic career in 1852, and represented France successively at Cassel, Stuttgart, Turin, and Rome. He was sent to Vienna in 1861, and held the post of ambassador there until in May, 1870, he entered the Ollivier cabinet as minister of foreign affairs. When Prince Leopold of Hohenzollern spontaneously renounced his candidacy for the Spanish crown, Gramont further insisted that the king of Prussia should give a solemn promise that no prince of his house should in future be a candidate for the throne of Spain. On July 15 Gramont officially announced to the French chambers that war existed between France and Prussia. When the Ollivier ministry were compelled to resign, Aug. 9, 1870, Gramont retired to private life. During and since the war he has been the object of vehement attacks in the French journals. In January, 1872, he was

summoned, with Marshal Leboeuf, to appear before a committee of inquiry into the causes of the revolution of Sept. 4, 1870.

GRAMPIANS, a range of mountains traversing Scotland diagonally from S. W. to N. E. for 150 m., and forming the natural boundary between the highlands and the lowlands. Beginning in Argyshire, on the W. coast, near the S. W. extremity of Loch Awe, they pass along the W. and N. boundaries of Perthshire, including the Ben Lomond hills in Stirlingshire to the south, and at Cairn Ealer divide into two branches, which pass to the sea respectively on the N. and S. sides of the river Dee. The term is not strictly limited in its application, but in its widest usage it includes all the highest mountains of Scotland. Several of its summits, as Ben Nevis, Ben Macdhu, Cairntoul, and Cairngorm, rise to a height of about 4,000 ft.

GRAMPUS, a porpoise-like cetacean, belonging to the genus *phocaena* (Cuvier); English writers, however, make a generic name of the word grampus, calling the animal *G. orca* (Fabr.). The name seems to be a corruption of the French *grand poisson* (large fish), to which its size well entitles it. Other names are finner and black-fish whale, from its dorsal fin and prevailing color; killer or thrasher, from its alleged habit of attacking and killing the whale. It attains a length of 25 to 30 ft., with a circumference of 10 or 12; the snout is short and rounded, the lower jaw broader and shorter than the upper; the teeth are about 44, 22 above and 22 below, large, strong, conical, and somewhat hooked; the so-called dorsal fin, near the middle of the back, is 4 ft. high, and the pectorals are large and oval; the tail is lunate, thick, and powerful. The color is black above, suddenly changing to white on the sides and beneath; a large white patch behind and above the eyes. It is occasionally



Grampus (*Grampus orca*).

seen on our coast, and not unfrequently on the shores of Europe and in the middle Atlantic; its favorite haunts are the northern regions, in the vicinity of Greenland and Spitzbergen. They are often met in small herds of six or eight, chasing each other as if in sport; they are swift and strong, which renders their capture difficult, and they yield comparatively little oil. The grampus is exceedingly voracious

and entirely carnivorous, devouring large fish, such as cod, halibut, skates, turbot, &c., smaller cetaceans, and even seals. American whalers call it killer and thrasher, and affirm that a herd of them will surround a large whale, bite and tear away its flesh with their powerful teeth, and finally weary and destroy it; the accounts of such cetacean combats are probably exaggerated, but from the size, strength, and voracious habits of the grampus, no doubt even whales sometimes fall victims to their hungry herds. The oil, though small in quantity, is of excellent quality. Gray, in the *Spicilegium Zoologica*, vol. ii., describes other species, as *G. intermedius*, *Heavisidii*, and *obscurus*, the last two from the Cape of Good Hope; all the species are frequently called dolphins, though they have not the prolonged beak of the latter.

GRAN (Hung. *Esztergom*). I. A N. W. county of Hungary, traversed from W. to E. by the Danube; area, 424 sq. m.; pop. in 1870, 65,306, mostly Magyars. The surface toward the centre is flat, in the north generally level, and mountainous in the south. The river Gran (Hung. *Garam*), which rises in the Carpathians, traverses the N. E. portion of the county. The soil, which is generally fertile, produces corn, fruits, and wine, of which the Neszmélyi is favorably known in commerce. Coal, limestone, and gray, red, and variegated marble are found. II. A city, capital of the county, on the right bank of the Danube, crossed here by a bridge, opposite the mouth of the Gran, 24 m. N. N. W. of Pesth; pop. in 1870, 8,780. It is a royal free city, the seat of an archbishop, primate of Hungary, who was made cardinal in 1874, and contains many remarkable buildings, the most conspicuous of which are the palace of the primate, the houses of the chapter, and the cathedral, in the Italian style, one of the finest churches of Europe, built on a precipitous height overlooking the Danube. It has also a gymnasium and a theological seminary. The inhabitants are chiefly employed in the manufacture of woollen cloth. Gran is said to have been founded by the Romans. It continued to flourish until it was destroyed by the Tartars, on their invasion of Hungary, 1241-'3. At a later period it was taken by the Turks, and reconquered in 1683 by John Sobieski.

GRANADA. I. A W. department of Nicaragua, between Lake Nicaragua and Lake Managua, and bordering on the Pacific; area, 2,943 sq. m.; pop. about 56,000. The general aspect of this department is that of an extensive table land, with a gentle descent toward the lakes and steep acclivities on the side of the Pacific. A low central chain of mountains divides the country into almost equal portions, the northern and western being essentially volcanic, though cultivated in every direction and densely populated, in spite of the great scarcity of water. Among the numerous volcanoes are Mombacho, Masaya, Madera, and

Ometepe, on the beautiful island of Zapatera, in Lake Nicaragua. A few of the volcanoes are still active, but the most recent serious eruption was that of Masaya in 1858. Besides the two large lakes, there are several small ones having no visible outlet. There are no navigable rivers. The mineral productions are abundant, and many mineral springs exist. II. A city, capital of the department, on the W. shore of Lake Nicaragua, 27 m. S. E. of Managua; pop. about 10,000. The streets are irregular and unpaved. There are three ancient churches. On the lake side stand the remains of the old fortifications of the city. A company was formed in 1872 for raising the water of the lake to the city by machinery, the elevation being 58 ft. The hospital is in a dilapidated condition, and one wing is used as a prison for females. The university courses are held in the halls of the ancient cloister of San Francisco. The situation of Granada is unequalled in a commercial point of view by any other inland town in Central America, but its trade is at a low ebb, although the products of several departments concentrate here for shipment by the lake steamers, which leave twice or thrice a month, and reach the Atlantic through the Rio San Juan. The town was founded in 1523, and was in the latter part of the 17th century repeatedly plundered and partially destroyed by buccaners. The usurper Chamorro having taken refuge here, the democrats besieged the city from May, 1854, to February, 1855. After the death of Chamorro, in 1855, the filibuster William Walker took the city by surprise, burned it, and established a provisional government which lasted till 1857, when Granada was retaken by the united arms of San Salvador and Guatemala. A large portion of the city has been rebuilt since that time; but whole squares still lie in ruin, covered with vegetation.

GRANADA. I. An ancient kingdom of Spain, in Andalusia, now comprising the three modern provinces of Malaga, Granada, and Almeria, bounded S. and E. by the Mediterranean; greatest length about 200 m., greatest breadth about 80 m.; area, 11,063 sq. m. The surface is diversified, with lofty mountains, beautiful valleys, and extensive plains. The Sierra Nevada mountains traverse the territory from E. to W.; their summits are crowned with perpetual snow, and one of them, the Cerro de Mulhacen, attains an elevation of 11,654 ft. above the sea, and is the highest mountain in Spain. The only railway of the province connects the city of Granada with Antequera and the railway from Malaga to Cordova. The principal rivers are the Jenil, the Almanzora, and the Guadalorze. The climate of the mountain districts is cold, that of the plains temperate, and that of the valleys sultry and unhealthy, especially during the prevalence of the wind called *solano*, which blows periodically from the Mediterranean. The soil is barren or fertile in proportion to the possibil-

ity of irrigating it from the mountain streams. Agriculture is the chief business. The principal manufacture is silk. The wine is generally inferior, but the *tierno*, muscatel, and Malaga are exceptions, and have a high reputation. The sugar cane grown in the neighborhood of Velez Malaga is deemed fully equal to that of the West Indies for size and juiciness. The foreign trade is not important, and is chiefly carried on through the ports of Almeria and Malaga. This province formed an opulent, civilized, and powerful kingdom under a Moorish dynasty founded in 1238, which was overthrown by Ferdinand the Catholic in 1492. II. A modern province, bounded N. by Cordova, Jaen, and Albacete, E. and S. by Almeria and the Mediterranean, S. W. by Malaga, and N. W. by Cordova; area, 4,937 sq. m.; pop. in 1870 estimated at 485,000. It is almost entirely mountainous, the only large tract of level country within its boundaries being the Vega or plain of Granada, on the Jenil, between the capital and Loja. III. A city, the capital of the province and kingdom, on two declivities of the Sierra Nevada and on the plain between them, 34 m. from the Mediterranean, and 224 m. S. of Madrid; lat. 37° 18' N., lon. 3° 40' W.; pop. about 68,000. The river Darro flows through it, and falls into the Jenil just outside the walls. The site of the city is about 2,000 ft. above the sea, and its appearance from a distance is singularly picturesque and beautiful. It is divided into the city proper, the Alhambra suburb, the Albaycin suburb, and the Antequeruela suburb. The first three are partially fortified, but the fourth is entirely open, and here the working classes generally reside. The streets are narrow and crooked, but the houses are well built in antique oriental style. There are several handsome squares and numerous public fountains. But the public edifices and the monuments of its former splendor are the great attractions of Granada, and first among these must be ranked the Alhambra, or ancient palace of the Moorish kings. (See ALHAMBRA.) The Gothic cathedral is profusely ornamented with jasper and colored marble, and surmounted with a dome resting on 12 arches, beneath which stands the gorgeously decorated altar. The church of Nuestra Señora de las Angustias is remarkable for its altar and towers; the church of San José, a modern structure, for its elegance. The monastery of San Gerónimo contains the tomb of its founder, Gonsalvo de Cordova; but his bones were dug up and cast out by a mob who plundered the convent in 1836. Granada contains the unfinished palace of Charles V., the Generalife, a Moorish palace surrounded with gardens and fountains, an episcopal palace, a university, and a general hospital, as well as many conventual establishments for both sexes. The chief manufactures are silk, woollen stuffs, hats, paper, saltpetre, and gunpowder. The trade is insignificant, and the roads leading to the city are so wretch-

ed that in the rainy season they are almost impassable. Granada was founded by the Moors in the 10th century, and from 1238 was the capital of the kingdom of Granada till its sub-

version in 1492, when it was taken by Ferdinand and Isabella after a protracted siege. It prospered for another century, but when the Moors, who composed the greater part of



Granada.

its population, were finally expelled from Spain in 1609, it received a blow from which it has never recovered. At the height of its splendor it is said to have contained as many as 500,000 inhabitants.

GRANADA, New. See COLOMBIA.

GRANADILLA (Span., diminutive of *granada*, a pomegranate), the Spanish-American name for the edible fruit of several species of *passiflora*, especially that of *P. quadrangularis*. The genus *passiflora*, which will be described under **PASSION FLOWER**, is well known for the great beauty of the flowers of many species which are common greenhouse climbers. Other edible-fruited species are *P. edulis*, *P. laurifolia* (the water lemon), *P. maliformis* (the sweet calabash), and *P. incarnata*, the maypop of the southern states. *P. quadrangularis* is a native of the West Indies, where its fruit is esteemed for the dessert. In French works upon horticulture it is placed among the exotic fruits to be grown under glass, and granadillas thus produced are sometimes seen in the markets of Paris and London. In our greenhouses the plant is often seen in flower, but rarely in fruit, as gardeners do not seem to be aware that the flowers require to be artificially fertilized with their own pollen or that of some other species, else the fruit will not set. The fruit is 6 or 8 in. in diameter, of a mulberry color, and with an odor something like the pineapple or strawberry. The purple pulp, which encloses numerous seeds, is subacid, and is usually eaten with wine and sugar. In contrast with the fruit, the root of this species is powerfully narcotic and emetic.

GRANBY, John Manners, commonly called marquis of, an English general, born Jan. 2, 1721, died in Scarborough, Oct. 19, 1770. He was the eldest son of the third duke of Rutland, was educated at Eton and Cambridge, and during the rebellion of 1745 raised a regiment of foot at his own expense. In 1759 he was sent to Germany as second in command, under Lord George Sackville, of the troops destined to co-operate with Prussia. Lord George having resigned, Granby succeeded to the chief command of the British, and served with distinction during the remainder of the seven years' war. In 1760, while still in the field, he was appointed a member of the privy council. In 1763 he became master general of the ordnance, and in 1766 commander-in-chief of the forces. He also served several terms in parliament. He was exceedingly popular, but his military qualities appear to have been greatly overrated.

GRAND, the N. W. county of Colorado. See SUMMIT.

GRANDEE (Span. *grande de España*), the highest rank of Spanish nobility. The grantees of Spain were the great nobles descended from the ancient chief feudatories of the crown, and from members of the royal family. They had the right to levy soldiers under their own banner, were free from taxes, and could not be subjected to the jurisdiction of any civil or criminal court without the express command of the king. They also claimed the right to make war upon the king without incurring the guilt of treason. As the power of the monarch increased, the privileges of the grantees were restricted, till little was left but the right

of wearing their hats in the royal presence, and of being saluted by the guards at the royal palace. The Spanish *grandees* considered themselves superior in rank to all the other nobility of Europe, and second only to princes of royal blood. On public occasions the order of precedence placed them next to the high prelates. Many of the *grandees* had no title; others had the titles of count, marquis, and duke, and some possessed enormous estates. Among the richest were the dukes of Medina Celi, Alva, Ossuna, Altamira, Infantado, and Arcos. The duke of Arcos, in the latter part of the 18th century, maintained 3,000 servants. The *grandees* have no privileges now.

GRAND FORKS, a N. E. county of Dakota territory, recently formed, and not included in the census of 1870; area, about 4,000 sq. m. It is separated on the east from Minnesota by the Red river, and is drained by several affluents of that stream.

GRAND HAVEN, a city, port of entry, and the capital of Ottawa co., Michigan, at the mouth of Grand river, on the E. shore of Lake Michigan, opposite Milwaukee, and 90 m. W. N. W. of Lansing; pop. in 1870, 3,147. It is bounded on two sides by hills, and in the neighborhood are extensive peach orchards. Springs possessing medicinal properties have lately been discovered. The city contains one of the finest hotels in the state, a cemetery of 40 acres, and three school houses. It is the W. terminus of the Detroit and Milwaukee railroad, and is intersected by the Michigan Lake Shore line. Steamers run throughout the year to Milwaukee, and in summer a daily line plies to Grand Rapids. The principal manufactures are seven saw mills, a shingle mill, a machine shop, two ship yards, and one manufactory each of agricultural implements and furniture, of sash, doors, and blinds, of spinning wheels, and of curtain rollers. There are a dry dock, a national bank, two weekly newspapers, a high school, and 11 churches. Grand Haven was laid out in 1836, though a trading post had been established on its site by the northwestern fur company in 1825. It received a city charter in 1867.

GRAND ISLE, a N. W. county of Vermont, consisting of a number of islands in Lake Champlain and the S. part of a peninsula jutting into the lake from Canada between Richelieu or St. John's river and Missisquoi bay; area, about 77 sq. m.; pop. in 1870, 4,082. The chief islands are North Hero, South Hero, and Isle La Motte. The surface is undulating, and the soil fertile. The county is famous for its orchards, which yield the finest apples in the state. The chief productions in 1870 were 21,073 bushels of Indian corn, 105,431 of oats, 26,876 of buckwheat, 26,295 of peas and beans, 51,599 of potatoes, 160,653 lbs. of butter, 83,838 of wool, 12,271 tons of hay, and 15,982 lbs. of hops. There were 1,285 horses, 2,827 cattle, and 16,087 sheep. The lake is here navigable by vessels of 90 tons. The Vermont

Central railroad crosses the N. part of the county. Capital, North Hero.

GRAND MANAN, or *Menan*, an island off the E. coast of Maine, at the entrance to the bay of Fundy, belonging to Charlotte co., New Brunswick; pop. in 1871, 1,867. Its length is nearly 20 m., and its average breadth about 5 m. It abounds with excellent timber, and has several fishing stations. The coast is deeply indented, and affords numerous good harbors. There is a lighthouse on the island, lat. 44° 45' 52" N., lon. 66° 44' 4" W.

GRANDPRÉ, Louis Marie Joseph Ohier, count de, a French navigator and traveller, born in St. Malo, May 7, 1761, died in Paris, Jan. 7, 1846. After a long experience on the sea as a trader, he entered the navy, and at the end of 15 years' service was admitted to the *hôtel des invalides*, where he remained until his death. He published *Voyage à la côte occidentale d'Afrique, fait dans les années 1786 et 1787* (2 vols. 8vo, 1801), in which he gives an interesting account from his own observation of the Congo slave trade before the French revolution; *Voyage dans l'Inde et au Bengale fait dans les années 1789 et 1790* (1801), followed by *Voyage dans la mer Rouge*. He also published a *Dictionnaire universel de géographie maritime* (2 vols. 4to, 1803), an *Abrégé élémentaire de géographie physique* (8vo, 1825), a *Répertoire polyglotte de la marine* (2 vols. 8vo, 1829), and many essays, among them a *Mémoire sur l'emplacement que l'île Atlantide peut avoir occupé entre l'ancien et le nouveau monde*.

GRAND RAPIDS, a city and the capital of Kent co., Michigan, situated at the rapids of Grand river, here spanned by five bridges, 30 m. E. of Lake Michigan and 60 m. W. N. W. of Lansing; pop. in 1850, 2,686; in 1860, 8,085; in 1870, 16,507, of whom 5,725 were foreigners. It is built on both sides of the river, which here, deviating from its general W. direction, runs nearly S. between high bluffs about a mile apart, which gradually diverge and nearly disappear above and below the city. The central school building, erected in 1868 at a cost of \$50,000, is on the highest part of the bluffs E. of the river, and commands a fine view. The county jail, built in 1872, is a fine specimen of architecture. There are many handsome residences, a number of gravelled streets, and several miles of street railroad. The river is navigable to this point for steamers of considerable size. Six railroads intersect here: the Detroit and Milwaukee, the Grand Rapids and Indiana, the Grand River Valley division of the Michigan Central, the Kalamazoo division of the Michigan Southern, the Chicago and Michigan Lake Shore, and the Grand Rapids, Newaygo, and Lake Shore. The rapids furnish extensive water power, which is utilized by means of two canals. The one on the E. side of the river is 2,600 ft. long, 140 ft. wide at the upper and 30 ft. at the lower end; the W. side canal is 3,300 ft. long, 100 ft. wide at the upper and 50 ft. at

the lower end. Only a portion of the available power is in actual use. The principal manufactures are of wood work, embracing furniture, barrels, and rim and bent work, tubs, pails, sashes and blinds, carriages and wagons, &c. There are also manufactories of agricultural implements and brushes, several founderies and machine shops, chemical works, tanneries, breweries, &c. The pine lumber produced in 1872 exceeded 60,000,000 ft. A large establishment for preserving fruit has recently been erected. Four firms, with an aggregate capital of \$400,000, are engaged in quarrying and manufacturing gypsum, which is abundant in the vicinity, the annual production being about 100,000 tons. Cream-colored bricks, known as Milwaukee bricks, are also manufactured here. There are two national banks with an aggregate capital of \$700,000, and a savings bank. The city is divided into eight wards, is lighted with gas, and has an efficient police force and a paid fire department. The assessed value of property in 1873 was \$4,949,282. The United States circuit and district courts for the W. district of Michigan are held here. The school buildings are nine in number, including a high school. There is a public library with more than 7,000 volumes, a free reading room, and a scientific institute which has a fine museum. There are three daily and five weekly (one Dutch and one German) newspapers, two monthly periodicals, and 20 churches. Grand Rapids was first settled in 1833, and incorporated in 1850.

GRAND RIVER (Ind. name, *Washtenong*), a river of Michigan, and the largest which lies wholly in that state. It rises in the S. E. part of the lower peninsula, in two branches which unite near Jackson, and after a N. W. and W. course of about 270 m., including its numerous windings, it discharges into Lake Michigan at Grand Haven. It is about 950 ft. wide at its mouth, and deep enough for vessels of less than 12 ft. draught. Steamboats ascend 40 m. to the rapids, where the river has a fall of 18 ft. in a mile; and small boats ply between the head of the rapids and Lyons, about 50 m. further. The principal affluents are the Rogue, Flat, Maple, Looking-glass, and Red Cedar from the north, and the Thornapple from the south. Jackson, Lansing, Grand Rapids, and Grand Haven are the chief towns on its banks.

GRAND RIVER, one of the constituents of the Colorado of the West, rises in the Rocky mountains in Colorado territory, 5 or 6 m. W. of Long's peak, in about lat. 40° 17' N., lon. 105° 43' W. It pursues a general S. W. course of about 350 m., and joins the Green in Utah territory. It bends S. just before entering Utah, and then N. as it crosses the boundary, resuming its general direction. The only important tributary from the north is Milk creek, which joins the main stream near its source. From the south it receives the Blue river (which, rising near the base of Mt. Lincoln, has by some been regarded as the true source of the Grand), Piney creek,

Roaring fork, the Gunnison or South fork (the largest tributary), and the San Miguel and Dolores rivers, which unite and empty into the Grand just beyond the Utah border. It flows through a mountainous region, forming deep and precipitous cañons.

GRAND TRAVERSE, a N. W. county of the S. peninsula of Michigan, bounded N. E. by Grand Traverse bay; area, about 500 sq. m.; pop. in 1870, 4,443. It is drained by Grand Traverse river, which enters the bay of the same name. The surface is undulating and dotted over with a great number of small lakes. The chief productions in 1870 were 31,157 bushels of wheat, 26,708 of Indian corn, 15,218 of oats, 94,174 of potatoes, and 3,544 tons of hay. There were 2 flour and 9 saw mills. Capital, Grand Traverse City.

GRANDVILLE, Jean Ignace Isidore, whose real name was GÉRAUD, a French caricaturist, born in Nancy in September, 1803, died at Vanves, near Paris, in March, 1847. He was the son of a miniature painter, and attracted attention in 1828 by his *Métamorphoses du jour*, illustrating prevailing follies and vices by representing well known personages with the faces of animals. His political caricatures and his pictures of animals increased his reputation, and he furnished many designs for illustrated and humorous journals, for Lafontaine's fables, and for many other works. In the latter part of his life he took up fantastic and ghostly subjects, and he died in a lunatic asylum.—See *Grandville*, by Charles Blanc (Paris, 1855).

GRANE, Gran, or Quade (Arabic, *El-Kueit*), a seaport town of Arabia, in the district of El-Hasa or Ahssa, on a bay of the same name, at the N. W. corner of the Persian gulf, 90 m. S. of Bassorah; lat. 29° 23' N., lon. 47° 57' E.; pop. about 9,000. It is on a peninsula jutting into the bay, which is 60 m. in circuit, affords excellent anchorage for the largest vessels, and is well protected by the small island of Felej or Felitche. In the town there is a scarcity of water. Most of the houses are built of clay, but many wealthy merchants reside here. Trade is carried on with the Red sea and India.

GRANCE, National. See HUSBANDRY, PATRONS OF.

GRANGER, Gldeon, an American statesman, born at Suffield, Conn., July 19, 1767, died at Canandaigua, N. Y., Dec. 31, 1822. He graduated at Yale college in 1787, and rose to eminence at the bar. In 1801 President Jefferson appointed him postmaster general. He was reappointed by President Madison, but was displaced in 1814 for opposing Madison's policy. He then removed to Canandaigua, N. Y. He gave 1,000 acres of land to further the construction of the Erie canal.—His son FRANCIS, born Dec. 1, 1792, was also a prominent lawyer and member of congress, and postmaster general from March to July, 1841. He died at Canandaigua, N. Y., Aug. 28, 1868.

GRANICUS (now *Khodja Tehai*), in ancient geography, a small river of Asia Minor, rising

N. W. of Mt. Ida, and emptying into the Proponitis after a N. E. course of 50 or 60 m. It is famous as the scene of the first decisive victory of Alexander the Great over the Persians, 334 B. C.

GRANIER, Adolphe Bernard, commonly called A. GRANIER DE CASSAGNAC, a French journalist, born in the department of Gers about 1806. He was educated at the college of Toulouse, and began his career at Paris in 1832, by writing literary criticisms for the *Journal des Débats* and the *Revue de Paris*. The asperity of his articles displeased Bertin, editor of the *Débats*, and Granier joined the *Presse*, then just founded by Girardin. In this journal he defended Victor Hugo and the romantic school, and wrote severe criticisms upon Racine. A collection of these articles was published in 1852 under the title of *Portraits littéraires*. In 1837 he published *Histoire des classes ouvrières et des classes bourgeoises*, and in 1840 *Histoire des classes nobles et des classes anoblies*. He also wrote pamphlets in defence of slavery, by which he recommended himself to the planters of Martinique and Guadeloupe; and in 1840 he made a visit to the West Indies, of which an account was given in his *Voyage aux Antilles* (2 vols., 1842-'4). While there he married Mlle. Beauvallon, a creole. On his return to Paris he became editor of the *Globe*. His conduct of this journal involved him in various controversies and duels. In 1845 his brother-in-law Beauvallon, who was employed upon the same paper, killed Dujarrier, the manager of the *Presse*, in a duel, and was prosecuted for having used unfair means. He was acquitted, but was afterward convicted of having procured his acquittal with false witnesses. Granier de Cassagnac testified on these trials in behalf of his brother-in-law, and his character was compromised by their result. The *Globe* having been discontinued in 1845, he founded an ultra-conservative journal called *L'Époque*, which existed for two years. He was then sent by Guizot to found a journal at Rome for the promotion of French interests. On the breaking out of the revolution of 1848 he returned to France, but did not go to Paris till 1850. He was a declared opponent of the republic and a devoted adherent of Louis Napoleon. He became in 1850 the principal editor of the *Pouvoir*, then a regular contributor to the *Constitutionnel*, and in 1857 founded the *Réveil*. This survived but a year, and he then assumed the direction of the *Pays*. The next paper which he edited was *L'Écho*, which in 1863 was merged in the *Nation*. In 1866 he resumed the direction of the *Pays*. He was four times elected to the chamber of deputies, as a government candidate, 1852-'69. In the chamber he was a violent partisan of the government. In 1868 he voted with six of his colleagues against a law which was favorable to the press, and replied to arguments advanced by Picard and Ollivier in relation to it with a challenge to fight. Both he and his son, Paul de Cassagnac, be-

came notorious for the great number of controversies, duels, and broils in which they were engaged. After the French reverses in the war of 1870-'71 he resided partly at Wilhelmshöhe and partly at Brussels. After the restoration of peace he returned to Paris and wrote occasionally for the *Pays*. In 1873 he published *Histoire des origines de la langue française*, in which he contended, as he had done in the *Presse* in 1836 and in his *Antiquité des patois: antériorité de la langue française sur le latin* (1859), that the French was spoken in Gaul before Latin was introduced. He has also published *Histoire des causes de la révolution française* (1850; 2d ed., 3 vols., 1856); *Histoire du directoire* (3 vols., 1851-'6); *Histoire de la chute du roi Louis Philippe, de la république de 1848 et du rétablissement de l'empire* (2 vols., 1857); *Histoire des Girondins et des massacres de septembre* (2 vols., 1860); and *L'Empereur et la démocratie moderne* (1861).

GRANITE, a hard firm rock, made up essentially of crystalline grains of feldspar and quartz, deriving its name from its granular structure. The typical granites are generally described as composed of a potash feldspar (orthoclase), quartz, and mica; but there are similar rocks which entirely lack the mica, and others in which it is replaced by hornblende. To this latter combination some writers give the name of syenite, but this term appears to have been originally employed to designate a rock composed of hornblende with a soda feldspar (albite, oligoclase, or labradorite), and without quartz, being identical with what by other authors is called diorite. It seems better therefore to follow the example of certain German lithologists, who define granite as a binary aggregate of orthoclase feldspar and quartz, in which mica and hornblende may be present as accidental minerals, giving rise to micaceous and hornblendic granite, while the variety from which they are both absent is termed normal or binary granite. In some cases a chloritic mineral, often confounded with talc, takes the place of mica, and gives rise to what has been called protogine or talcose granite. The color of the feldspar of granite is generally white, gray, or reddish, while the quartz is either colorless or somewhat smoky, the hornblende greenish black, and the mica varies in color from nearly white to brownish or blackish. Associated with the orthoclase, some granites contain portions of a soda feldspar, which may be either albite or oligoclase, distinguished from the former by its white or greenish-white color, which often contrasts with the reddish tint of the orthoclase. There are various degrees of fineness in the texture of granites, and some of them, which have large crystals of orthoclase imbedded in a finely granular mixture of the constituent minerals, are called porphyritic granites. Geologically granite is described as an unstratified rock, from the fact that it wants the banded or stratified structure which characterizes gneiss, a

granular rock made up of the same mineral species arranged in layers, which are generally supposed to represent planes of deposition. Moreover, granite appears in irregular masses, breaking through gneiss and various crystalline stratified rocks, and often sending out veins or dikes into the midst of these. All the relations of the true granites to the stratified rocks are in fact such as to suggest the notion that the former have been extruded in a more or less pasty condition from below the latter. From the microscopic study of the minute cavities often found in the quartz of granites, which are filled with water or saline solutions, Sorby has concluded that this rock must have consolidated at a temperature in some cases approaching a red heat, and under a degree of pressure which implies that it was at that time buried beneath a very great weight of rock. There is a popular notion that granite is the oldest of all rocks, and is in fact the substratum which underlies all others; but this idea rests upon certain misconceptions, and is probably incorrect. It is true that it is found breaking up through the newer crystalline stratified rocks, the primitive slate formations of some geologists; but these are seen to rest upon an older formation composed in great part of highly crystalline gneiss, which, though often granite-like in its aspect, is clearly stratified, and includes beds of quartzite, limestone, and iron ores. This oldest known series, to which the name of Laurentian is given, was by some of the earlier geologists mistaken for the granite which was supposed to underlie the newer series, and it has been suggested with much probability that it is the gneisses of this old series, which in a softened condition have been forced upward among the overlying formations, where they take the form of unstratified granites. The primitive rock, which is supposed to have been before all stratified deposits, is everywhere concealed by these, and from chemical analogies may be supposed to have been very unlike granite. The so-called granites of the Alps are now shown to be stratified rocks of eozoic age, which by great and profound folds have been brought up and made in some cases to overlie the newer strata. (See ALPS.)—The dikes of a fine-grained granite, which appear as offshoots from the great eruptive masses, are not to be confounded with the granite veinstones, which appear to have been formed by a process of gradual deposition from aqueous solution in fissures or cavities in the rocks. Such veins, although often made up in great part of feldspar and quartz with mica, are closely related to the veinstones of quartz and calc spar, which are so often the gangue of metallic ores. They frequently present a banded structure parallel with the walls of the enclosing rock, and are remarkable for containing in many cases large and beautiful crystals, not only of the constituent minerals of granite, but of rarer species. Among the most common of these are garnet, tourmaline,

beryl, topaz, columbite, and cassiterite. The gneisses and mica schists of what has been called the Montalban or White mountain series of the Appalachians are noted for the abundance of these veins, and for the fine minerals which these contain. Some of these granite veins are mined for the mica which they afford, and others for the pure and abundant white orthoclase which is sought for the manufacture of porcelain. These veins are of very various sizes, sometimes 100 feet or more in breadth, and often traverse the enclosing rocks at right angles. A peculiar aggregate is sometimes found in these veins, in which plates and imperfect skeleton crystals of quartz are so scattered through the masses of cleavable orthoclase, that a section across the ends of these plates presents the appearance of written characters or hieroglyphics on a ground of feldspar; hence the name of graphic granite.—Granite is very strong and durable, and resists the atmospheric influences; but in the southern and western parts of the United States and in South America, as also in central France, it is found to be softened and decayed to considerable depths. This softening, which Dolomieu called the *maladie du granit*, and ascribed to the evolution of carbonic acid from the interior of the earth, depends upon a chemical decomposition of the feldspar, which loses its alkali and a part of the silica in a soluble form, leaving a hydrated silicate of alumina, which in its purest form constitutes kaolin or porcelain clay. The feldspars and hornblends of the gneisses undergo a similar change. According to Sterry Hunt, this decomposition is not recent, and is not connected with an evolution of carbonic acid from below, but was effected in remote periods, when the whole atmosphere was highly charged with this gas, and has ceased in modern times; although it is not impossible that some such changes may now be going on in localities where an abundance of carbonic acid is given off from the earth. The red granites from Peterhead, near Aberdeen in Scotland, are especially esteemed for their beauty of color. Similar red granites are found on the coasts of Maine and New Brunswick; and the hornblende granites of Rockport and Quincy in Massachusetts are quarried in very large quantities and shipped to distant points.—True granite is found in masses of great solidity, unbroken by seams and of remarkably uniform structure. It is seen upon the sides of mountains covering acres, with hardly a crack or seam. But, however massive and unbroken it appears, it exhibits when quarried a tendency to divide more easily in some directions than in others, and is found to be really traversed by parallel seams, which separate it into blocks more or less symmetrical. Having great durability, and being so hard and compact that the finer varieties are susceptible of a good polish, and when carved retain better than any other rock used for architectural purposes the sharp edges of mouldings, granite has always

occupied the first rank among building stones. Its great strength to resist pressure is exhibited in the trial of the Aberdeen granite used in the construction of the piers in the vaults of the London custom house. A half-inch cube of the best stone required to crush it the pressure of 24,556 lbs. It is easily split in large blocks by a very simple process. With a hand drill and hammer a workman bores a succession of holes from $3\frac{1}{4}$ to 6 in. in depth, and 2 to 6 in. apart, along the line where he wishes to open the stone. The depth and number of the holes are proportioned to the size of the block. Into each of the round holes thus made he introduces two slips of iron called half-rounds, buckings, or feathers, being of wedge form, but round on one side, and running to a point. He then inserts a small steel wedge between the flat faces of the two half-rounds and gently tightens it with the hammer. This being done, he moves along the line tapping each wedge in order, and repeating the process till the strain causes a crack, which gradually opens, separating the block. Good granite of close grain and uniform texture should in this way make a clean separation, the crack going straight through twice or three times the depth of the holes. It may even be quarried out of the solid ledge in the same manner, provided there are natural seams; and where practicable the process is much to be preferred to blasting, which wastes the stone, breaking it into irregular fragments. But the latter is necessary in quarrying, to expose suitable faces for splitting, and to open seams. Blocks of great size may be obtained from good quarries, much larger indeed than there is any demand for. They are often split out from 40 to 80 ft. in length, and are afterward reduced to smaller sizes. They are sold in the rough blocks commonly by the ton of 14 cubic feet, or if dressed, by the superficial foot of hammered surface. In many parts of the country gneisses of great homogeneousness and with little evidence of stratification are quarried under the name of granite, for which they furnish an excellent substitute. Such is the case with some of the gneisses of the Laurentian in New York, and still more with the fine-grained gray gneisses of the Montalban series in New England and further southward in the Blue Ridge. The so-called granites of Hallowell and Augusta in Maine, and of Concord in New Hampshire, are examples of these granite-like gneisses. They are somewhat more tender than the true granites, but are more easily wrought, and from their beauty of color and texture are greatly esteemed for architectural purposes. A very fine variety of so-called granite is largely quarried on the James river near Richmond, Virginia, but it is not certain whether it is a true granite or one of the gneisses above described.

GRANSON, or **Grandson**, a town of Switzerland, in the canton of Vaud, on the lake of Neuchâtel, near its S. W. extremity; pop. about 1,500. It is chiefly memorable for the

victory achieved near it, March 3, 1476, by the Swiss over Charles the Bold of Burgundy. (See CHARLES THE BOLD.)

GRANT, a word constantly used in deeds of conveyance, and which once had a specific meaning, that now is almost lost. By the rules of the early common law all estates of land of which actual delivery could be made, could be transferred only "by livery (delivery) of seisin (possession);" that is, by open and actual or symbolic (a key for a house, a sword for a field, &c.) transfer of possession from the one party to the other. But there were valuable interests which could not be transferred in this way, as rents, estates in expectancy, reversions and remainders, and generally all mere rights and all incorporeal hereditaments. These could be transferred only by deeds containing the proper words of transfer. Of these, one of the principal was *concedo*, translated by "grant;" and all things which could be transferred only in this way were said "to lie in grant," while all of the first named class of interests and estates were said "to lie in livery." With *concedo* (grant), *do* (give) was always used; and these two words, "give and grant," were said to be the appropriate and peculiar words of a grant. This distinction between livery and grant was once very important; but it is now little more than a part of the obsolete learning of the law. In all deeds of land, or of any interest in land, corporeal or incorporeal, it is customary to say "give and grant." In several of the United States the peculiar meaning and force of the word may be regarded as abrogated by statute; for all deeds of bargain and sale, of lease and release, and all conveyances of the freehold, are declared to be grants. The same broad construction is given to the word by the practice of conveyancers and of courts in other states, and it would probably be found to prevail generally for all practical purposes.

GRANT, the name of 11 counties in the United States. **I.** A N. E. county of West Virginia, bordering N. W. on Maryland, crossed by the Alleghany mountains, and watered by the N. and S. branches of the Potomac; area, 500 sq. m.; pop. in 1870, 4,467, of whom 331 were colored. The soil of the valleys is fertile. Iron ore is found. The chief productions in 1870 were 31,631 bushels of wheat, 52,350 of Indian corn, 10,593 of oats, 67,587 lbs. of butter, 20,689 of wool, and 4,787 tons of hay. There were 1,435 horses, 1,739 milch cows, 4,730 other cattle, 7,551 sheep, and 3,116 swine. Capital, Grant Court House. **II.** A N. central parish of Louisiana, bounded E. by Little river and S. W. by Red river; area, about 500 sq. m.; pop. in 1870, 4,517, of whom 2,414 were colored. It is well watered. The surface is level, and the soil productive. Pine timber abounds. The chief productions in 1870 were 58,786 bushels of Indian corn, 9,948 of sweet potatoes, 2,119 of peas and beans, and 4,377 bales of cotton. There were 651 horses, 1,097 milch cows, 1,771 other cattle, and 4,791

swine. Capital, Colfax. **III.** A S. central county of Arkansas, watered by the Saline river; area, about 650 sq. m.; pop. in 1870, 3,943, of whom 339 were colored. The surface is generally level, and the soil fertile. The chief productions in 1870 were 105,664 bushels of Indian corn, 22,147 of sweet potatoes, and 1,145 bales of cotton. There were 748 horses, 1,367 milch cows, 3,303 other cattle, 2,022 sheep, and 8,770 swine. Capital, Sheridan. **IV.** A N. county of Kentucky, drained by Eagle river, an affluent of the Kentucky; area, about 200 sq. m.; pop. in 1870, 9,529, of whom 509 were colored. It occupies a part of the Dry Ridge, which separates the waters of the Licking from those of the Kentucky. The Louisville and Cincinnati short line railroad passes near the N. border. The surface is undulating and well timbered, and the soil is fertile. The chief productions in 1870 were 41,974 bushels of wheat, 20,384 of rye, 611,568 of Indian corn, 31,059 of oats, 17,668 of potatoes, 137,407 lbs. of butter, 164,295 of tobacco, and 1,541 tons of hay. There were 3,790 horses, 2,364 milch cows, 3,960 other cattle, 7,233 sheep, and 19,563 swine; 4 flour mills, 5 saw mills, and 2 wool-carding and cloth-dressing establishments. Capital, Williamstown. **V.** A central county of Indiana, drained by Mississinewa river; area, 420 sq. m.; pop. in 1870, 18,487. It is intersected by the Pittsburgh, Cincinnati, and St. Louis railroad. It has a level surface and an excellent soil, adapted to grain, grass, and fruit. The chief productions in 1870 were 374,574 bushels of wheat, 540,453 of Indian corn, 68,349 of oats, 41,657 of potatoes, 375,244 lbs. of butter, 84,824 of wool, 28,068 bushels of flax seed, and 9,448 tons of hay. There were 6,942 horses, 5,052 milch cows, 6,636 other cattle, 25,290 sheep, and 27,045 swine. The principal manufactories were 12 of carriages, 2 of clothing, 2 of woollen goods, 6 flour, 3 planing, and 32 saw mills. Capital, Marion. **VI.** A S. W. county of Wisconsin, separated from Iowa on the W. and S. W. by the Mississippi river, bounded N. and N. W. by the Wisconsin and S. by Illinois; area, 1,080 sq. m.; pop. in 1870, 37,979. The surface is diversified by valleys, ridges, prairies, and woodlands; the soil, watered by Platte, Grant, Blue, and other rivers, is fertile. Lead and zinc are abundant, and the former metal is found throughout the S. part of the county, which is said to produce more than 6,000,000 lbs. a year. There were 5 mines in operation in 1870. The Milwaukee and St. Paul (Prairie du Chien division) railroad crosses the N. part, and the Mineral Point railroad terminates at Platteville in this county. The chief productions in 1870 were 914,455 bushels of wheat, 1,744,398 of Indian corn, 1,433,020 of oats, 44,316 of barley, 288,017 of potatoes, 17,971 of flax seed, 861,028 lbs. of butter, 75,821 of wool, 44,585 of hops, and 39,244 tons of hay. There were 13,901 horses, 13,312 milch cows, 23,301 other cattle, 24,936 sheep, and

51,254 swine; 18 manufactories of carriages, 9 of barrels and casks, 3 of bricks, 1 of gunpowder, 6 of pig lead, 9 of saddlery and harness, 5 of woollen goods, 5 saw mills, 4 breweries, and 13 flour mills. Capital, Lancaster. **VII.** A central W. county of Minnesota; area, about 625 sq. m.; pop. in 1870, 340. There are a number of small lakes and streams. The surface is level, and the soil fertile. The St. Paul and Pacific railroad crosses the S. W. part. Capital, Grant Court House. **VIII.** A S. W. county of Nebraska, bordering on Kansas, and bounded on the N. E. by the Platte river; area, about 3,000 sq. m.; pop. in 1870, 484. Since then it has been absorbed by other counties. **IX.** A S. E. county of Oregon, bordering on Nevada; area, 21,000 sq. m.; pop. in 1870, 2,251, of whom 940 were Chinese. The N. W. portion is watered by John Day's river, a branch of the Columbia, the E. part by Malheur river, an affluent of the Snake, and in the south are a number of lakes. The Blue mountains cross the N. part. Along the streams is some fertile land, the grazing lands are more extensive, and forests are common, but much of the county consists of barren sage plains and rocky hills. Gold was discovered in this county in 1861, since which time it is estimated that \$10,000,000 have been produced. The chief productions in 1870 were 17,459 bushels of wheat, 23,426 of oats, 22,172 of barley, 13,225 of potatoes, and 1,193 tons of hay. There were 507 horses, 1,384 milch cows, 2,112 other cattle, 1,154 sheep, and 1,248 swine. Capital, Canyon City. **X.** An E. county of Dakota territory, bordering on Minnesota, recently formed, and not included in the census of 1870; area, about 700 sq. m. It is bounded on the N. E. by Big Stone lake, and is drained by affluents of the Minnesota river. **XI.** The S. W. county of New Mexico, bounded S. by Mexico and W. by Arizona; area, about 10,000 sq. m.; pop. in 1870, 1,143. The Gila river and its tributaries drain the N. and W. portions, while the Rio de los Mimbres flows through the E. part. The Sierra Madre range occupies a portion of the county. The soil in parts is fertile. Copper and gold are found, and there are three quartz mills and a saw mill. Capital, Pinos Altos.

GRANT, Anne, better known as Mrs. Grant of Laggan, a Scottish authoress, born in Glasgow, Feb. 21, 1755, died in Edinburgh, Nov. 7, 1838. Her father, Duncan McVicar, an officer in the British army, was ordered to America while she was a child. He received a grant of land in Vermont, and added to it by purchase. Ill health obliged him to return to Scotland in 1768, and his lands were confiscated on the breaking out of the revolutionary war. In 1779 Anne married the Rev. James Grant of Laggan, Inverness-shire, and had a large number of children. On his death in 1801 she was left in straitened circumstances, and in 1803 published a volume of poetry, which met with immediate favor. She next

published "Letters from the Mountains" (3 vols., London, 1806-7), which contains descriptions of highland scenery, character, and legends. Her "Memoirs of an American Lady" (2 vols., 1808) gives a pleasant picture of her own childhood and of colonial life in America. Other works are, "Essays on the Superstitions of the Highlanders of Scotland" (2 vols., 1811), and "Eighteen Hundred and Thirteen, a Poem" (1814). After 1810 she resided in Edinburgh, and toward the close of her life she received a pension of £100. In 1844 appeared the "Memoir and Correspondence of Mrs. Grant of Laggan" (3 vols.), the memoir being an autobiography, continued by her son, John Peter Grant, who died in Edinburgh in 1871.

GRANT, Sir Francis, a Scottish artist, born in Edinburgh in 1803. His precocious talent for painting was encouraged by Sir Walter Scott, and his earliest work was exhibited in 1834. In 1837 he executed for the earl of Chesterfield "The Meet of his Majesty's Staghounds," with more than 40 portraits of noted sportsmen. Subsequently he produced "Melton Hunt," which was purchased by the duke of Wellington. Afterward he became distinguished as a portrait painter, and executed numerous pictures of beautiful women and celebrated men. In 1866 he succeeded Eastlake as president of the royal academy.

GRANT, James, a British journalist, born in Elgin, Scotland, in 1806. He started the "Elgin Courier" in 1827, and removed to London in 1834, where he soon formed a connection with the "Morning Advertiser," and became its editor in 1850. He has published "Random Recollections of the House of Commons" (London, 1836), "The Bench and the Bar" (2 vols., 1837), "The Metropolitan Pulpit" (2 vols., 1839), "Travels in London," "Portraits of Public Characters," and "Paris and its People." His "God is Love" and "Our Heavenly Home" have passed through many editions. In 1871 he published in two volumes "The Newspaper Press, its Origin, Progress, and Present Position."

GRANT, James, a Scottish novelist, born in Edinburgh, Aug. 1, 1822. His father was an officer in the British army, and his own education was mostly received in barracks in British North America. After serving for a short time in the 62d regiment as ensign, he resigned his commission in 1840, and devoted himself to literature. He has been a voluminous writer of military and historical romances, some of which have had a very extensive circulation in a cheap form. His chief publications are: "The Romance of War" (4 vols., 1846-7); "Adventures of an Aide-de-Camp" (1848); "Memoirs of Kirkcaldy of Grange" (1849); "Walter Fenton, or the Scottish Cavalier" (1850); "Bothwell, or the Days of Mary, Queen of Scots" (1851); "Jane Seton" (1853); "Harry Ogilvie" (1856); "Dick Rodney" (1862); "Second to None" (1864); "The White Cockade" (1867); and "Under the Red

Dragon" (1872). Most of his works have been reprinted in the United States; some have been translated into French, and all into Danish and German. Mr. Grant is a frequent contributor to periodicals.

GRANT, James Augustus, a British traveller, born in Nairn, Scotland, in 1827. He was educated at Marischal college, Aberdeen. In 1845 he received an appointment in the Indian army, took part in both sieges of Mooltan and in the battle of Guzerat, and was with Havelock at Lucknow. In 1861 he accompanied Capt. Speke on his second expedition to the lake region of central Africa. After traversing a district never before visited by white men, they reached Gondokoro in March, 1863, whence they soon after returned to England. Capt. Grant furnished the designs of the maps and engravings in Speke's "Journal of the Discovery of the Source of the Nile," and in 1864 published "A Walk across Africa, or Domestic Scenes from my Nile Journal." In 1866 he was made a commander of the bath. In 1868 he accompanied Lord Napier in the Abyssinian expedition as head of the intelligence department, and was nominated a commander of the order of the star of India for his services. He is now (1874) a major in the Bengal army.

GRANT, Sir James Hope, a British soldier, brother of Sir Francis Grant, born at Kilgraston, Perthshire, July 22, 1808. He entered the army in 1826, and was brigade major under Lord Saltoun in the first English war against China. He served through the campaign in the Punjab in 1848-9, continued in the Indian service, and was made brevet colonel in 1854, and major general and knight commander of the bath in 1858. The last distinction was conferred upon him especially in recognition of distinguished service at the siege of Delhi, the relief of Lucknow, and the operations at Cawnpore. He was put in command of the British forces in China in 1859, and conducted the campaign there to its successful termination in the capture of Peking in 1860. For this he was formally thanked by parliament, and made a knight grand cross of the bath. In 1861 he was made lieutenant general and commander-in-chief at Madras, in 1867 quartermaster general at headquarters, and in 1871 commander of the division at Aldershot. In January, 1874, a compilation from his private journals during his Indian campaigns was published in London, under the title of "Incidents in the Sepoy War, 1857-8."

GRANT, Ulysses S., eighteenth president of the United States, born at Point Pleasant, O., April 27, 1822. His ancestors were Scotch. In 1823 his parents removed to the village of Georgetown, O., where his boyhood was passed. He entered West Point military academy in 1839, appointed by the Hon. Thomas L. Hamer, member of congress. His name originally was Hiram Ulysses; but the appointment was blunderingly made out for Ulysses S., and so it had to remain. The study in which he showed

most proficiency during his course at the academy was mathematics. He graduated in 1843, ranking 21st in a class of 39, and was made a brevet second lieutenant of infantry and attached as a supernumerary lieutenant to the 4th regiment, which was stationed on the Missouri frontier. In the summer of 1845 the regiment was ordered to Texas, to join the army of Gen. Taylor. On Sept. 30 Grant was commissioned as a full lieutenant. He first saw blood shed at Palo Alto, May 8, 1846, and took part also in the battles of Resaca de la Palma and Monterey, and the siege of Vera Cruz. In April, 1847, he was made quartermaster of his regiment, but still participated in all active operations; and after the battle of Molino del Rey, Sept. 8, 1847, he was appointed on the field a first lieutenant for his gallantry. In his report of the battle of Chapultepec (Sept. 13, 1847) Col. Garland, commanding the first brigade, said: "The rear of the enemy had made a stand behind a breastwork, from which they were driven by detachments of the 2d artillery under Capt. Brooks and the 4th infantry under Lieut. Grant, supported by other regiments of the division, after a short but sharp conflict." "I must not omit to call attention to Lieut. Grant, 4th infantry, who acquitted himself most nobly, upon several occasions, under my own observation." Grant was brevetted captain for his conduct at Chapultepec, to date from the battle. After the capture of the city of Mexico he returned with his regiment, and was stationed first at Detroit, and then at Sackett's Harbor. In 1848 he married Miss Julia T. Dent of St. Louis, sister of one of his classmates. In 1852 he accompanied his regiment to California and Oregon, and while at Fort Vancouver, Aug. 5, 1853, was commissioned full captain. On July 31, 1854, he resigned, and removed to St. Louis, cultivating a farm near that city and engaging in business as a real estate agent. In 1859 he was employed by his father in the leather trade at Galena, Ill.—When the civil war broke out, he was chosen to command a company of volunteers, with which he marched to Springfield. There he was retained as an aid to Gov. Yates, and acted as mustering officer of Illinois volunteers until he became colonel of the 21st regiment, his commission dating from June 17, 1861. He joined his regiment at Mattoon, organized and drilled it at Caseyville, and then crossed into Missouri, where it formed part of the guard of the Hannibal and Hudson railroad. On July 31 he was placed in command of the troops at Mexico, forming a part of Gen. Pope's force. On Aug. 23 he was promoted to brigadier general of volunteers, the commission being dated back to May 17, and assumed command of the troops at Cairo, which were soon increased by the addition of Gen. McClelland's brigade. He seized Paducah, at the mouth of the Tennessee, on Sept. 6, and Smithland, at the mouth of the Cumberland, on the 25th. In a proclamation to the citizens of Paducah he said: "I have

nothing to do with opinions, and shall deal only with armed rebellion and its aiders and abettors." On Oct. 16 he sent out a detachment under Col. Plummer to check the advance of the confederate forces under Gen. Jeff Thompson, which was accomplished by a battle at Fredericktown, Mo., on the 21st. On Nov. 7, with two brigades, Grant fought the battle of Belmont, where he commanded in person and had a horse shot under him. Gen. Halleck, on assuming command of the department of Missouri, gave Gen. Grant the command of the district of Cairo (Dec. 21), which was so extended as to form one of the largest military divisions in the country, including the southern part of Illinois, that portion of Kentucky west of the Cumberland river, and the southern counties of Missouri. After a reconnaissance in force toward Columbus in January, 1862, Grant started on Feb. 3 from Paducah, with a force of 15,000 men, aided by Commodore Foote with a fleet of gunboats, for the capture of Forts Henry and Donelson, the former of which commanded the Tennessee river, and the latter the Cumberland, near the dividing line between Kentucky and Tennessee. Fort Henry, commanded by the confederate Gen. Tighman, surrendered on Feb. 6, and Fort Donelson, commanded by Gen. Buckner, on the 16th. The reduction of Fort Henry was mainly the work of the gunboats; Fort Donelson was only captured after a severe battle (Feb. 15), in which the federal forces, which had been increased to 30,000 or more, sustained a loss of 2,300. In answer to Buckner's proposal that commissioners be appointed to arrange the terms of capitulation, Grant wrote: "No terms other than an unconditional and immediate surrender can be accepted. I propose to move immediately upon your works." The capture of Fort Donelson with all its defenders except Gen. Floyd's brigade was the first brilliant and substantial victory that had crowned the federal arms. To the gratification at so great a military success was added a popular admiration of the terse and soldierly declaration in which the surrender had been demanded; and the hero of the affair sprang at once into national celebrity. He was immediately commissioned major general of volunteers, to date from Feb. 16. Gen. C. F. Smith had been directed by Gen. Halleck to make an expedition up the Tennessee with about 40,000 men; but he died soon after it started, and the command devolved upon Gen. Grant. A large portion of the force, after lying three weeks at Pittsburgh Landing, in preparation for an attack on Corinth, was surprised at daybreak of April 6 by an overwhelming confederate force under Gen. A. S. Johnston, driven from its camp, and routed with heavy loss. Gen. Grant arrived on the field of battle at 8 A. M., and reformed the lines. Heavy reinforcements, under Gen. Buell, having arrived in the night, the battle was renewed on the 7th, and the enemy, defeated, withdrew

to Corinth. The loss on each side was about 12,000. Gen. Grant was slightly wounded. Gen. Halleck, arriving at the front two or three days afterward, began siege operations against Corinth; but the confederates evacuated the place on the last days of May. Halleck was called to Washington on July 11, and Grant became commander of the department of West Tennessee, with headquarters at Corinth. The most serious problem that demanded his immediate attention was the disposal of guerillas, spies, and traders, who were crossing the lines on all sorts of pretexts, carrying information and stores to the enemy. He issued several severe orders against them, took possession of all unoccupied buildings in Memphis and rented them for the benefit of the United States government, and gave the Memphis "Avalanche" the alternative of suspending publication or dismissing an editor who had written an "incendiary and treasonable" article. On Sept. 17 Grant ordered an advance from Corinth, to stop the progress of the confederate Gen. Price, who had a large force concentrated at Iuka. A battle was fought at this place, Sept. 19, and a complete victory gained. As Gen. Bragg's force was pushing toward the Ohio river, Grant now removed his headquarters to Jackson, Tenn. The confederates under Price and Van Dorn, 40,000 strong, attacked his position at Corinth, which was held by Rosecrans with about 20,000 (Oct. 3 and 4). After a desperate fight, the assailants were repulsed with heavy loss and pursued beyond the Hatchie river. Buell moved out to intercept Bragg, and defeated him at Perryville, Oct. 8, whereupon he retreated to East Tennessee. On the 16th Gen. Grant's department was extended by the addition of a portion of Mississippi, as far as Vicksburg, and designated as the department of the Tennessee; the forces under his command were constituted the 13th army corps. The most stringent measures were taken to prevent plundering and illegal trading, as necessary to military discipline under the peculiar circumstances of an army so placed in a mingled community of friends and foes. After unsuccessful movements against Vicksburg, "the Gibraltar of the Mississippi," from the north, and the loss of an immense quantity of stores which the confederates (Dec. 20) seized and destroyed at Holly Springs, Grant moved his army down the west bank of the river, crossed to the east side at a point below the city on the last day of April, 1863, defeated the enemy in the actions of Raymond, Jackson, Champion's Hill, and Big Black, preventing Gen. J. E. Johnston from joining Pemberton at Vicksburg, and laid siege to that place, May 18. The city was surrendered, with about 27,000 prisoners, on July 4, 1863. Thereupon Grant was promoted to the rank of major general in the regular army. In October he was placed in command of the military division of the Mississippi, comprising the departments commanded by Sherman,

Thomas, Burnside, and Hooker. Immediately after the capture of Vicksburg he had sent heavy reinforcements to Gen. Sherman on the Big Black river, who was thereby enabled to drive the confederate force under Johnston out of Jackson. Grant concentrated his forces for the defence of Chattanooga, which was threatened by Bragg, and the latter's positions on Missionary ridge and Lookout mountain were carried by assault on Nov. 24 and 25. Bragg's forces retreated to Dalton, Ga., being followed as far as Ringgold. The pursuing columns were then sent to the relief of Knoxville, which, held by Burnside, was closely invested by Longstreet. Gen. Halleck, in his annual report, said: "Considering the strength of the rebel position and the difficulty of storming his intrenchments, the battle of Chattanooga must be considered the most remarkable in history. Not only did the officers and men exhibit great skill and daring in their operations on the field, but the highest praise is due to the commanding general for his admirable dispositions for dislodging the enemy from a position apparently impregnable. Moreover, by turning his right flank and throwing him back upon Ringgold and Dalton, Sherman's forces were interposed between Bragg and Longstreet, so as to prevent any possibility of their forming a junction." The first measure passed in the congressional session of 1863-'4 was a resolution providing that a gold medal be struck for Gen. Grant, and returning thanks to him and his army. Resolutions of thanks were also passed by the legislatures of New York and Ohio. A bill reviving the grade of lieutenant general in the army was passed by congress, and on March 1, 1864, received the signature of President Lincoln, who at once nominated Gen. Grant for the position. The senate confirmed the nomination on the following day. On the eve of starting for Washington to receive the commission, Grant wrote a letter to Gen. Sherman, in which he said: "Whilst I have been eminently successful in this war, in at least gaining the confidence of the public, no one feels more than I how much of this success is due to the energy, skill, and the harmonious putting forth of that energy and skill, of those whom it has been my good fortune to have occupying subordinate positions under me. There are many officers to whom these remarks are applicable to a greater or less degree, proportionate to their ability as soldiers; but what I want is, to express my thanks to you and McPherson, as the men to whom, above all others, I feel indebted for whatever I have had of success." Grant arrived in Washington on March 9, received his commission at the hands of the president, and on the 17th issued his first general order, dated at Nashville, assuming command of the armies of the United States, and announcing that headquarters would be in the field, and until further orders with the army of the Potomac. Not before during the civil war had any one

general in the field commanded all the national armies. Grant, with nearly 700,000 men in the field, at once planned two campaigns, to be directed simultaneously against vital points of the confederacy by the two chief armies under his command: the one, under Gen. Meade, to operate against Richmond, defended by Lee; the other, under Gen. Sherman, against Atlanta, defended by Johnston. At midnight on May 3 Grant began the movement against Richmond, crossing the Rapidan with the army of the Potomac, which was joined two days later by the 9th corps under Burnside, and, with an aggregate force of 140,000 men, pushing through the Wilderness by the right of Lee's position, in the endeavor to place himself between the confederate army and the confederate capital. Lee was apprised of the movement on the morning of the 4th, and boldly took the offensive, pushing eastward to strike the federal columns on the march. The immediate result was the bloody battle of the Wilderness, which foiled Grant's first attempt to interpose his army between Lee's and Richmond. Making another advance by the left flank, he was again confronted by Lee at Spottsylvania; and after partial success and a bloody repulse, he repeated the movement again, only to find Lee in a strong position on the North Anna river; and still a fourth advance brought the army of the Potomac before the absolutely impregnable rifle pits of Cold Harbor. After a costly assault on these, Grant once more moved his army by the left flank and crossed the James. The day after the success of Spottsylvania he had sent a despatch to the government, which closed with these words: "I propose to fight it out on this line if it takes all summer." His losses in the campaign from the Rapidan to the James (May 3 to June 15) were 54,551, killed, wounded, and missing. Lee's losses were about 32,000. Sherman opened his campaign toward Atlanta as soon as Grant telegraphed to him that the army of the Potomac had crossed the Rapidan. At the same time Grant had directed Sigel to advance from Winchester up the Shenandoah toward Staunton, and Crook to advance from Charleston up the Kanawha toward Lynchburg. But Sigel was defeated at Newmarket by Breckinridge, and Crook, after considerable fighting, was compelled to retreat. Meanwhile Gen. Butler, with the army of the James, had been directed to capture and hold Petersburg, and if possible to invest Richmond closely from the south side, but had totally failed to do so. All these flanking movements being foiled, and Lee being neither defeated in the open field nor cut off from Richmond, the great problem of the war instantly narrowed itself down to a siege of Petersburg, which Grant now began. Lee's attempt to create a diversion by an invasion of Maryland and an attack on Washington failed, Sheridan ultimately driving back the invaders up the valley of the Shenandoah; while, in Georgia,

Johnston was unable to check the advance of Sherman, and his successor in command, Hood, was forced to evacuate Atlanta, and lost his army before Nashville. The siege of Petersburg ended, after the victory at Five Forks, in the beginning of April, 1865, when Richmond was evacuated and Lee retreated westward toward Danville, followed closely by Grant, who finally forced the surrender of his remaining force, which took place at Appomattox Court House, April 9.—After the war Grant fixed his headquarters at Washington; and on July 25, 1866, he was commissioned general of the United States army, the rank having been created for him. On Aug. 12, 1867, when President Johnson suspended Secretary Stanton from office, Gen. Grant was made secretary of war *ad interim*, and held the position until Jan. 14, 1868, when he returned it to Mr. Stanton, whose removal the senate had refused to sanction. The president wished Grant to retain the office notwithstanding the action of congress, and Grant, in a letter to him dated Feb. 3, closing a somewhat tangled correspondence, said: "I can but regard this whole matter, from the beginning to the end, as an attempt to involve me in the resistance of law for which you hesitated to assume the responsibility in orders, and thus to destroy my character before the country. I am, in a measure, confirmed in this conclusion by your recent orders directing me to disobey orders from the secretary of war, my superior and your subordinate, without having countermanded his authority to issue the orders I am to disobey." At the republican national convention held in Chicago May 21, 1868, Gen. Grant on the first ballot was unanimously nominated for president, with Schuyler Colfax for vice president. Their democratic competitors were Horatio Seymour and Francis P. Blair. Grant and Colfax carried 26 states, and received 214 electoral votes, against 80 for Seymour and Blair. Grant was inaugurated president on March 4, 1869, and on the next day sent in to the senate the following nominations for cabinet officers: Elihu B. Washburne of Illinois, secretary of state; Alexander T. Stewart of New York, secretary of the treasury; Jacob D. Cox of Ohio, secretary of the interior; Adolph E. Borie of Pennsylvania, secretary of the navy; John M. Schofield of Illinois, secretary of war; John A. J. Creswell of Maryland, postmaster general; E. Rockwood Hoar of Massachusetts, attorney general. These nominations were at once confirmed, but it was discovered that Mr. Stewart was disqualified by an act of 1789, which provided that no person should hold the office of secretary of the treasury who was "directly or indirectly concerned or interested in carrying on the business of trade or commerce." The president, in a brief message, thereupon suggested to congress that Mr. Stewart be exempted by joint resolution from the action of the law. This was objected to, and Mr. Stewart declined, and George S. Boutwell of Massa-

chusetts was appointed in his stead. Soon afterward Mr. Washburne gave up the office of secretary of state, being appointed minister to France, and was succeeded by Hamilton Fish of New York; while Secretary Schofield retired from the war department, and was succeeded by John A. Rawlins of Illinois, who died in September, when the vacancy was filled by the appointment of William W. Belknap of Iowa. Mr. Borie resigned in June, and was succeeded by George M. Robeson of New Jersey. Mr. Hoar resigned in July, 1870, and was succeeded by A. T. Akerman of Georgia, who resigned in December, 1871, and was succeeded by George H. Williams of Oregon. Mr. Cox resigned in November, 1870, and was succeeded by Columbus Delano of Ohio. As President Grant was in political harmony with the majority in congress, the reconstruction of the lately rebellious states, which had been delayed by the lack of such harmony during the previous administration, now went on. A proclamation by President Grant, dated May 19, directed that there should be no reduction of the wages paid to government employees in consequence of the reduction in the hours of labor which congress had enacted. In 1871 President Grant urged the annexation of Santo Domingo as a territory of the United States. A treaty to effect this, and also one by which the peninsula and bay of Samana were ceded to the United States for 50 years at an annual rental of \$150,000 in gold, had been signed Nov. 29, 1869, on behalf of President Grant and President Baez. Early in 1870 these treaties were confirmed by a popular vote in Santo Domingo; but it was believed that a free election had not been held, and it was said that, in anticipation of annexation, the Dominican government had granted to private individuals every valuable franchise or piece of property in its possession. In conformity with a resolution of congress, President Grant appointed B. F. Wade of Ohio, A. D. White of New York, and S. G. Howe of Massachusetts, as commissioners to visit Santo Domingo, accompanied by several scientific men, and report upon the condition of the country, the government, and the people. Their report, submitted in April, 1871, was favorable to annexation; but the senate withheld its approval of the treaties. A "joint high commission" of five British and five American members met at Washington, Feb. 27, 1871, and on May 8 signed a treaty on the subject of the coast fisheries, river navigation, and the "Alabama claims." The last named question was submitted to a court of arbitration to meet at Geneva, Switzerland, which on Sept. 14, 1872, awarded the gross sum of \$15,500,000, to be paid by the British government to the United States for damages to American commerce by confederate cruisers fitted out in British ports. The act to enforce the provisions of the 14th amendment of the constitution, popularly known as the Ku-Klux bill,

was followed by a presidential proclamation exhorting obedience to it; and on Oct. 17, 1871, the president suspended the privilege of habeas corpus in the northern counties of South Carolina. Under the provisions of an act of congress of March 3, 1871, President Grant appointed a board of seven commissioners to inquire into the condition of the civil service and devise a plan for rendering it more efficient. The chairman of the board, George William Curtis, resigned in March, 1873, because of essential differences between his views and the president's on the enforcement of the rules. At the national republican convention held in Philadelphia, June 5, 1872, President Grant was renominated by acclamation, and Henry Wilson of Massachusetts received the nomination for vice president; while Horace Greeley and B. Gratz Brown were the candidates of both the liberal republicans and the democrats. Grant and Wilson received 286 votes in the electoral college, against 80 for other candidates. Grant's popular majority over Greeley was 762,991. During the last session of the 42d congress the salary of the president was doubled, and those of the vice president, speaker of the house, justices of the supreme court, and heads of departments increased 25 per cent. William M. Richardson of Massachusetts became secretary of the treasury March 4, 1873, and was succeeded on June 2, 1874, by Benjamin H. Bristow of Kentucky. On the death of Chief Justice Chase in 1873, the president nominated successively George H. Williams, Caleb Cushing, and Morrison R. Waite of Ohio; the last named was confirmed. On April 22, 1874, he vetoed a bill to increase the currency.—Accounts of the battles fought by Gen. Grant will be found under their respective titles. See "Military History of Ulysses S. Grant," by Adam Badeau (vol. i., New York, 1868); "Life of Ulysses S. Grant," by C. A. Dana and J. H. Wilson (Springfield, 1868); and "Report of the Operations of the Union Army from March, 1862, to the Close of the Rebellion" (New York, 1866).

GRANVELLE, Antoine Perrenot, cardinal de, a Spanish statesman, born in Besançon, Aug. 20, 1517, died in Madrid, Sept. 21, 1586. He was the son of Nicolas Perrenot, the chancellor and minister of the emperor Charles V. He was educated at Dôle, Padua, and Louvain, and mastered seven languages. At the age of 23 he was appointed canon of Liège cathedral and bishop of Arras. At the council of Trent, in 1545, he defended the emperor's war policy against France, and obtained an appointment as councillor of state. After the battle of Mühlberg (1547) he drew up the treaty of peace between the emperor and the German Protestants, and contrived to retain the landgrave of Hesse a prisoner, contrary to the promise made to him. In 1550 he succeeded his father as chancellor. He accompanied the emperor on his flight from Innspruck in 1552, and displayed great ability in negotia-

ting the treaty of Passau, which followed it. The first service of importance which he rendered Philip, the emperor's son, was in arranging (1553) his marriage with Mary of England. On the accession of Philip II. in 1555, Granvelle became his minister, and delivered on his behalf an eloquent address to the Flemish people. While Philip remained in the Netherlands he was guided by the counsels of his minister. The regulations in reference to Protestantism, adopted in 1550, were reenacted in 1556. The Spaniards having gained the victory of St. Quentin over the French, Granvelle was instrumental in negotiating the treaty of Cateau-Cambrésis, which was signed in 1559. Soon afterward Philip II. returned to Spain, and left Margaret of Parma regent of the Netherlands; but with her was associated a council, advisory power in doubtful and important cases being reserved to a *consulta* consisting of three members of the council. Granvelle was one of this select body, and had the other two completely under his control; and it was soon obvious that he wielded all the power of Spain in the Netherlands. His administration became odious, and his appointment was considered a violation of the law, because he was a foreigner. His paramount object was the restoration of the supremacy of the Catholic church. Spanish troops were retained in the country; the general assembly of the states was not called together; and 13 new bishoprics were created. In 1560 Granvelle was made archbishop of Mechlin, and primate. But what incensed the people most was the preparations for the introduction of the Spanish inquisition. Granvelle alone was held responsible for these abuses, and the wrath of the nobles and the people was concentrated upon him. In 1561 he was created a cardinal. In 1563 William of Orange, Egmont, and Horn united in a formal remonstrance to the king against his proceedings, but without avail. At last even Margaret of Parma yielded to the pressure and joined in the request for his recall. But it was not until Granvelle himself had signified his acquiescence that Philip II. commanded him "to leave the Low Countries for a few days, and go to Burgundy to see his mother." He obeyed the command in 1564, and never returned. He retired to Besançon, and occupied himself with literature and the physical sciences. In 1565 he went to Rome by the king's order, and participated in the election of Pope Pius V. In 1570 he was employed to negotiate the alliance between Spain, Rome, and Venice against the Turks. He next became viceroy of Naples, and in 1575 was recalled to Madrid, where Philip made him president of the supreme council of Italy and Castile. He negotiated the terms of union between Spain and Portugal, and when Philip went to take possession of his new kingdom, Granvelle acted as regent during his absence. The marriage contract between the infanta Catharine and the duke of Savoy was effected by his management. In 1584 he re-

signed the archbishopric of Mechlin, to accept the less opulent see of Besançon. He was a patron of letters, enriched the college of Besançon, founded by his father, and contributed largely to support the printing establishment of Plantin at Antwerp. He left a large number of his own letters, of those of foreign ministers, of Charles V., and of Philip, and of state papers and documents. Eighty years afterward they were assorted by the abbé Boissot, forming a collection of 82 volumes. A selection from them has been published by the French government (9 vols. 4to, 1841-'61).

GRANVILLE, a N. county of North Carolina, bordering on Virginia, intersected by Tar river and watered by the Nense river; area, about 750 sq. m.; pop. in 1870, 24,831, of whom 13,355 were colored. The surface is slightly hilly, and the soil generally good. The chief productions in 1870 were 110,209 bushels of wheat, 306,113 of Indian corn, 115,593 of oats, 16,484 of Irish and 34,298 of sweet potatoes, 129,595 lbs. of butter, 2,134,228 of tobacco, and 277 bales of cotton. There were 2,722 horses, 4,073 milch cows, 4,828 other cattle, 881 sheep, and 18,986 swine; 2 iron foundries, and 39 manufactories of tobacco. The county is traversed by the Raleigh and Gaston and the Roanoke Valley railroads. Capital, Oxford.

GRANVILLE, a village of Licking co., Ohio, pleasantly situated on an affluent of Licking river, 3 m. from the Central Ohio division of the Baltimore and Ohio railroad, and 25 m. E. N. E. of Columbus; pop. in 1870, 1,109. The town is neatly built. Denison university (Baptist) was organized in 1831, and in 1872 had 10 professors and instructors, 191 students (71 collegiate), and a library of 11,000 volumes. The scientific department, organized in 1854, had 21 students. The Granville female college had 8 instructors and 111 students; and the young ladies' institute (Baptist) had 8 instructors and 115 students.

GRANVILLE, a seaport town of Normandy, France, in the department of La Manche, on the English channel, at the mouth of the Bosq, 29 m. S. W. of St. Lô; pop. in 1866, 15,622. It has a small harbor with a fine granite pier capable of mounting cannon, is built in terraces formed on the side of a promontory, is surrounded with walls, and has a fort on the summit of the promontory. The town has a school of navigation, and the inhabitants are chiefly engaged in the cod and oyster fishery.

GRANVILLE, George, Baron Lansdowne, an English author and statesman, born in 1667, died Jan. 30, 1735. He entered Trinity college, Cambridge, at the age of 10, and three years later received the degree of M. A. About the same time he began to write poetry, and on the accession of James II. addressed several pieces of verse to him. During the reign of William and Mary he lived in retirement and wrote several plays, one of which, "Heroic Love," is highly praised in a passage of Dryden. His "British Enchanters" was per-

formed 40 times. Becoming by the death of his father and elder brother the head of the influential family of Granville, he entered parliament in 1710, and in the same year was appointed secretary of war in place of Walpole. In January, 1712, he was created Baron Lansdowne of Biddesford. Upon the queen's death he lost his offices, and, on account of his avowed sympathy for the pretender and his participation in the scheme for raising an insurrection in the west of England, was committed to the tower in September, 1715, where he was confined till Feb. 8, 1717. Being suspected again in 1722 of some connection with the Atterbury plot, he retired to France, and returning to England in 1732 published his works in prose and poetry in 2 vols. 4to.

GRANVILLE, Granville George Leveson Gower, second earl, a British statesman, born in London, May 11, 1815. He was educated at Eton and Oxford, and entered public life in 1835 as attaché to the British embassy at Paris, of which his father, the first Earl Granville, a well known diplomatist, was the head. In 1836 he was returned to parliament for the borough of Morpeth, subsequently became under secretary of state for foreign affairs, and sat for Lichfield from September, 1841, to January, 1846, when he succeeded to his title. He held the seals of the foreign office in the Russell cabinet from December, 1851, to February, 1852, and was lord president of the council from December, 1852, to June, 1854, from February, 1855, to February, 1858, and from June, 1859, to June, 1866. In 1868 he again became a member of the cabinet as secretary of state for the colonies. In the house of lords he was a leader in debate, and ably sustained liberal views in regard to the Irish church bill, 1869, and the land bill, 1870. On the death of Lord Clarendon in 1870 he became secretary for foreign affairs. He resigned with the other members of the Gladstone cabinet in February, 1874.

GRANVILLE, John Carteret, earl, an English statesman, born in Bedfordshire, April 22, 1690, died Jan. 2, 1763. He was educated at Westminster school and at Oxford, and as Baron Carteret took his seat in the house of lords in 1711. His zeal in support of the Protestant succession caused George I. to promote him in 1715 to be bailiff of the island of Jersey, and in 1716 to be lord lieutenant of Devonshire. In 1718 he was ambassador to Sweden; in 1720 ambassador extraordinary at the congress of Cambrai; from May, 1721, to April, 1724, secretary of state; and from that time till 1730, with a brief intermission, he was lord lieutenant of Ireland. Afterward he was prominent in the debates in the house of lords till February, 1742, when he was again made secretary of state, and in September following was sent to the states general to assist in devising measures to maintain the liberties of the United Provinces. The succeeding year he passed with the king in Hanover. In 1744, by the death of his mother, he succeeded to

the title of Earl Granville, and shortly after he was compelled to resign his office. During his parliamentary career he was conspicuous for his speeches on questions arising from the Edinburgh riots, and he was the mover for the settlement of £100,000 a year from the civil list on the Prince of Wales. Macaulay says: "No public man of that age had greater courage, greater ambition, greater activity, greater talents for debate or for declamation. No public man had such profound and extensive learning. His knowledge of modern languages was prodigious. He spoke and wrote French, Italian, Spanish, Portuguese, German, even Swedish." He alone of the ministers of George I. could converse with the monarch in his native tongue. His ministry was popularly termed the "drunken administration," an expression not altogether figurative, for Granville's habits were extremely convivial, and champagne lent its aid to keep him in that state of joyous excitement in which his life was passed. No misfortune could depress him. His spirits were constantly high. When driven from office, says Macaulay, "he retired laughing to his books and his bottle." Ill as he had been used, he did not seem, says Horace Walpole, "to have any resentment, or indeed any feeling except thirst."

GRAPE, the fruit of woody vines of the genus *vitis* (the ancient Latin name), the type of the order *vitaceæ*, which includes shrubs climbing by tendrils. At each node or joint of the grape-vine is borne a leaf, with a tendril or flower cluster upon the opposite side; the leaves are long-petioled, palmately veined, variously lobed and smooth or downy in different species; in the axil of each leaf are produced two buds, one of which develops the same season, producing what the vineyardist calls "laterals," while the other remains dormant as a provision for the growth of the following year. The tendrils are branched; the branches have hooks at the ends, and when these catch hold of some supporting object the tendril coils spirally, rapidly becomes woody, and holds the vine with great firmness. The tendril may be considered as a modified branch, which in some cases bears flowers and fruit; nothing is more common than to find in our native vines clusters in which one of their branches retains its tendril character and helps to hold up the fruit. The flowers of the wild grape are sometimes dioecious, but in cultivated ones perfect; they are very small; the calyx short and lined with a disk, which bears the petals and stamens; petals five, cohering at the apex, and forming a little cap which in flowering falls off entire; stamens five, with a gland or lobe of the disk between each pair; a single pistil, with a two-lobed stigma, has a two-celled ovary with two ovules in each cell; this in ripening becomes a one- to four-seeded berry. The flowers of the grape are delightfully fragrant, recalling the odor of mignonette. Grapes are found in the temperate climates of both

hemispheres. There is at present some confusion about the species, but in a horticultural view they are divided into European and American grapes. The European grape, *vitis vinifera*, is the species that in some of its numerous varieties is cultivated in most European



European Grape (*Vitis vinifera*).

and Asiatic countries. Regel, the distinguished botanist and director of the imperial gardens at St. Petersburg, has recently given the somewhat startling opinion that *V. vinifera* is not a true species, but a hybrid between *V. labrusca* and *V. vulpina*, both of which are natives of North America, Japan, Mantchooria, and the Himalaya. He bases his opinion upon the facts that the European vine is not found in a truly wild state, but only as an escape from cultivation, and that the two species suggested as its parents are found wild in that portion of Asia in which the cultivation of the vine originated. Whatever may have been its origin, it will continue to be known by our cultivators as the European or foreign grape. Very early in the history of America attempts were made to cultivate the foreign grape in the open air, and these have been repeated from time to time up to the present day; but in no instance have they met with success east of the Rocky mountains. In exceptionally favorable localities, as in city yards, the foreign vine has here and there succeeded for a few years; but in order to grow it with certainty it must have the protection of glass. Upon the Pacific coast the case is different; the Jesuit missionaries early discovered that the soil and climate were adapted to the foreign grape, and after California was settled by Americans grape culture, confined almost exclusively to foreign varieties, became one of the important industries of the state. (See AMERICAN WINES.) The foreign vine is distinguished from American species principally by the character of the fruit; in the latter the seeds are enveloped and held together by a

more or less firm pulp, which slips from the skin, while a foreign grape may be broken open with the pulp still adhering to the skin, and the seeds so free from it that they will fall out or may be readily separated. The cultivation of the foreign grape under glass is followed to a considerable extent both as a matter of luxury and of profit. Two modes of culture are practised: in the cold grapery, which is a glass house without artificial heat, and in the forcing grapery, which is heated and the vines brought into growth and fruiting at such times as are desired. For details reference may be had to special treatises.—Of American species of the genus *vitis* producing edible fruit, botanists recognize four: *V. labrusca*, the northern fox grape; *V. aestivalis*, the summer grape; *V. cordifolia*, the frost grape; and *V. vulpina*, the muscadine or southern fox grape. Several grapes from west of the Mississippi have been described as distinct species by some botanists, but others regard them as only forms of the above. The American grapes differ so much in the wild state, in form of leaf and size, shape, and color of the fruit, that it is often difficult to decide to which species a specimen should be referred; and when they are subjected to cultivation the variation is still more strongly marked. In no branch of fruit culture has there been greater progress than in the cultivation of American grapes. Twenty-five years ago the Catawba and Isabella were the only kinds grown to any considerable extent, while at the present time the varieties are numbered by hundreds, and additions are yearly made to the list. In the article AMERICAN WINES the leading varieties are named, and the species from which they are supposed to have originated indicated. In the vineyards of the eastern states the growing of the fruit for market is quite as important as raising it for wine, and in the wine districts the fruit is packed and shipped as table fruit so long as it will bring a price above that at which it can be profitably crushed for wine. By keeping them at a low temperature some varieties may be preserved in good condition



Flower of the Grape, magnified.

1. Young flower. 2. Vertical section of flower. 3. Flower without corolla.

for several months after they are gathered. Aside from the commercial value of the grape, it is of great importance as one of the few fruits that can be conveniently produced in cities and towns. While judicious treatment is essential to the best results, it will grow

and bear fruit under the most adverse circumstances, and it is cultivated for its abundant shade as well as for its fruit. Within a few years a new class of grapes has sprung up, produced by hybridizing native varieties with the foreign. Mr. Rogers of Salem, Mass., was the first to attempt this upon an extensive scale, but the varieties he produced are not very strongly marked with the characteristics of the foreign vine. Dr. Wylie of Chester, S. C., Mr. Underhill of Croton Point, N. Y., and others, have produced varieties which in the fruit make a near approach to the exotic grape, while the foliage is more like that of its native parent.—The vine is propagated with the greatest ease by layers and from cuttings; in commercial nurseries the propagation is from cuttings, except with a few varieties that take root with difficulty, and these are grown from layers. Cuttings of the last season's growth of wood removed in the autumn pruning, with two or three buds upon each, are buried in a dry place until spring, and then set out in rows with one bud at the surface of the ground and the others below; with some varieties a large percentage of such cuttings will form roots and make salable vines by autumn; other kinds are very uncertain when treated in this way, and these are started under glass, from what are called single eyes, which consist of one bud with a short piece of the wood attached; these eyes are planted in a bed of sand, and by a proper management of heat and moisture roots and leaves are soon formed, when the young plants are transferred to a rich soil. Vines are sometimes propagated, especially in the case of rare kinds, from cuttings of green shoots, but planters do not approve of vines thus produced. In the matter of pruning and training there is a considerable difference of opinion and practice among vineyardists, but they all agree in controlling the growth of the vine within certain bounds. Whatever the system of pruning, its successful practice depends upon a knowledge of the manner of growth of the vine. The fruit of a vine is produced upon shoots which in spring push from buds upon branches or canes which grew the season before. If a young vine consisting of a single stem having 20 buds is left unpruned, the majority of these buds will develop as shoots; the few uppermost will start first and be the most vigorous, while those below will be weak; at the end of the season such a vine will have two or three strong canes above and a few slender ones below; the next year, if still unpruned, the stronger canes will follow the same course as did the single one, and the most vigorous growth and the fruit-bearing buds will be still further from the root; and if the vine be allowed to grow entirely wild for several years, fruit will be found only upon the extreme branches. One great object in pruning is to keep the fruit-bearing portion of the vine near the ground; another is to keep up a constant supply of fruit-bearing wood, and another to

so regulate the amount of fruit borne by each vine that it shall attain the greatest possible development and excellence. The methods of pruning are thoroughly discussed in the recent treatises upon grape culture.—The vine grower has many enemies to contend with, one of the most destructive of which is mildew, which consists of two or more forms or species of parasitic fungi. The most common mildew upon native grapes, *peronospora*, appears as small grayish patches of down on the under side of the leaves, and on the young shoots and fruit stalks; if not arrested, it soon destroys the foliage of the vine and checks the development of the fruit. Flowers of sulphur, frequently and persistently applied by means of a bellows invented for the purpose, will prevent the further spread of this destructive parasite. Another form of mildew, *oidium* or *erysiphe*, makes its appearance on the upper side of the leaves and on the fruit, especially upon exotic vines under glass, though in certain situations and in very dry seasons it attacks vineyards of the native grape; one form of "rot" upon the fruit is due to this. Insects of various kinds, from the time the leaf begins to expand until the fruit is gathered, demand the constant vigilance of the cultivator. Of late years a minute aphid-like insect has been discovered, though its ravages were noticed long before the cause was ascertained, the *phylloxera vastatrix*; this attacks both the roots and the leaves, but not always to the same degree in all varieties; those that have descended from the summer grape (*V. aestivalis*) seem to be more exempt from its attacks than others. In Europe the devastations of this insect have been so great as to completely destroy the grape industry in parts of France as well as in other vine-growing countries. It is believed in France that the insect was introduced from this country, and in 1873 the commissioner of agriculture sent M. Planchon to investigate the habits of *phylloxera* in what they regard as its native localities. The best history of this insect will be found in the third, fourth, and fifth reports of C. V. Riley, state entomologist of Missouri, which are comprised in the reports of the Missouri state board of agriculture for 1870, '71, and '72. No satisfactory remedy has been discovered.—The principal varieties of foreign and native grapes are described in Downing's "Fruit and Fruit Trees of America" (revised ed., 1869) and other general works upon fruits. Special treatises upon the grape are numerous; the most important to the American cultivator are "American Grape Grower's Guide," by William Chorlton, and "Grape Culture and Wine Making," by A. Haraszthy, both mainly devoted to the foreign grape; "The Grape Culturist," by A. S. Fuller; "Grapes and Wine," by George Hussmann; and "Culture of the Grape," by W. C. Strong.

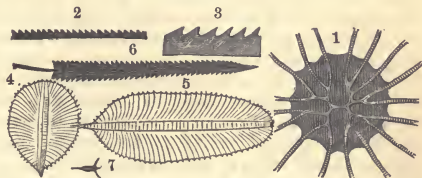
GRAPE SHOT, formerly small shot put into a canvas bag, which was corded into cylindrical form to fit the piece of ordnance from which

it was to be fired. This was superseded by canister shot, in which the balls are confined in a canister of iron plate. The term grape shot is now applied to an assemblage of iron shot fastened around a metallic spindle, giving the appearance of a bunch of grapes. The shots fly asunder as they leave the gun, and are very destructive at short distances.

GRAPHITE (Gr. *γράφειν*, to write), a mineral commonly called black lead or plumbago, but which titles are incorrect, as it contains no lead. Its composition is similar to that of anthracite coal, containing usually from 90 to 95 per cent. of carbon, with from 4 to 10 per cent. of iron, and traces of silica, alumina, lime, and magnesia. Specimens have been found in Ceylon said to contain 98.55 per cent. of carbon. It occurs in beds and imbedded masses and laminae, in granite, gneiss, mica schist, and crystalline limestone, and sometimes in greenstone. It is sometimes the result of alteration by heat of the coal formation, and is an ordinary artificial product of the destructive distillation of coal in the retorts of gas works. It is found in nature in both a crystalline and amorphous condition, opaque, of a metallic, steel-gray color and lustre, and giving a peculiar, shining, greasy streak on paper. Its specific gravity is 2.09, rising somewhat above this as impurities increase. Its hardness ranges between 1 and 2. Crystallized graphite occurs in six-sided tables, belonging to the hexagonal system, cleaving perfectly in the direction of the base, and having the basal planes striated parallel to the alternate sides; but the mineral is more commonly found in foliated or granular masses. It is found associated with olivine and sphene at Ticonderoga, N. Y., and in beds of gneiss at Sturbridge, Mass., usually in a scaly and granular, but sometimes approaching a crystalline form. It is also found at North Brookfield, Brimfield, and Hinsdale, Mass., at Brandon, Vt., and at Grenville, Canada, where it is associated with sphene and tabular spar. It occurs near Amity, Orange co., N. Y., in white limestone, associated with spinel, chondrodite, and hornblende; at Rossie, St. Lawrence co., with iron ore, and in gneiss; in Bucks co., Pa., near Attleboro, associated with tabular spar, pyroxene, and scapolite, and also in syenite at Mansell's black-lead mine near the same locality. There is a large deposit at St. John, N. B. The mine at Borrowdale in Cumberland, England, has long been celebrated for yielding graphite of a superior quality for making black-lead pencils, one of its principal uses. The mine has been known since the time of Queen Elizabeth, and probably furnished the first lead pencils ever made, as their invention cannot be traced back as far as the discovery of the mine. It is in a mountain, 8 m. S. of Keswick, 2,000 ft. high. The mineral occurs in small nests in trap. The pieces are about the size of the fist. The mine became so valuable as to be an object of plunder, being reached underground from neigh-

boring mines, and being once forcibly taken possession of at the surface. The graphite was of so pure a quality that it required but little preparation for the market; and much of it was sawed up in its natural state for pencils. The mine is now nearly exhausted, and has not been worked for many years. Graphite has been found in Germany, France, Austria, and South America, and in enormous masses in N. E. Siberia. Besides furnishing a material for writing pencils, it is used for making crucibles, and linings for small furnaces; as an ingredient in lubricating compounds for machinery; for giving a smooth surface to the moulds of metal castings, and for polishing stoves and iron castings generally; and also for a coating to wax or other impressions of objects designed to be electrotyped, for the purpose of forming a good conducting surface for the galvanic current. It has also been employed by Graham as a diaphragm in his diffusimeter or instrument for observing the comparative rate of diffusion of gases. (See **CRUCIBLE**, and **PENCIL**.)

GRAPTOLITES (Gr. *γράφειν*, to write, and *λίθος*, stone), a genus of fossil aculeophs, of as many as 20 species, found only in the Silurian rocks, abounding particularly in the slates of the Hudson river group. So numerous are these early forms of zoöphytes in the Llandeilo rocks of Europe, that it has even been thought probable that the carbonaceous character of the slates was owing to the abundance of their remains. As found in the black slates, their sil-



1. Graptolithus Loganii, showing the centre of a branching group. 2. Portion of a branchlet. 3. Same, much enlarged. 4, 5. Forms of Phyllograptus typus. 6. Graptolithus pristis. 7. Young of a graptolite.

very forms are obscurely retained, and the fossils may easily be mistaken for impressions of plants. They are long and slender, resembling some algae, as well as the feather part of a quill, whence their name. When found in calcareous strata their forms are more distinct. Their nearest living analogues are the sea firs or sertularians, of which the species inhabit muddy sediment, such as the black slates must once have been.

GRASS CLOTH. See **RAMIE**.

GRASSE, La, a town of S. E. France, in the department of Alpes-Maritimes, 18 m. W. of Nice; pop. in 1866, 12,241. It was formerly the seat of a bishop, has a Gothic cathedral, a college, a public library, and large manufactories of essences and perfumes, soap, and silk goods. In the vicinity are quarries of marble and alabaster, and extensive olive groves.

GRASSES, plants of the natural order *gramineae*, one of the most extensive in number of species and individuals, and one of the most important in its relation to man. The stem (culm) is jointed, sometimes solid, but usually hollow, and closed at the joints (nodes); from each joint rises a leaf stalk which is broad and envelops the stem, called the sheath (vagina), which with few exceptions is split upon one side for its whole length; at the apex of the sheaths are borne the leaves, which are alternate, the blade (lamina) usually narrow, and with parallel veins; where the blade and sheath join is a small membranous appendage, the ligule, which is sometimes represented by a fringe of hairs. The flowers are arranged at the summit of the stem in strict spikes, racemes, or loose panicles, and are in spikelets, which consist of one or numerous flowers (florets). The



FIG. 1.—Phleum, spikelet.

parts of the flowers are chaffy, usually green when young and becoming straw-colored at maturity, and are described collectively as glumaceous (Lat. *gluma*, a husk), a term also applied to the flowers of some allied families. In structure the flowers present some very complex forms, while that in the more common species is exceedingly simple, and may be readily understood by an examination of the common red-top, a species of *agrostis*, or timothy (*phleum*), to be found almost everywhere. A single spikelet of either of these will be found, as in the engraving of *phleum*, to consist of two concave scales called glumes, one placed slightly above and within the other; within these are the floret, consisting also of two scales, and the palets, the upper and inner of which is more or less covered by the outer, and usually smaller and of more delicate texture; the essential parts of the flower are within and protected by the palets; the stamens, one to six (usually three), have slender filaments with anthers attached by the middle (versatile); pistil one, with a one-celled, one-ovuled ovary crowned by two (rarely three) styles, the stigmas of which are feathery or hairy; the ovary in ripening becomes a grain (caryopsis), which consists of the usually adherent pericarp (the hull), within which is the seed proper, consisting of a small embryo situated at the base and on the outside of a floury albumen;



FIG. 2.—Aira, spikelet.

at the base of the pistil are situated one or two minute scales (lodicules), which are usually so small as to escape the notice of a careless observer, but in some genera are as long as the ovary. This is the general structure of one-flowered grasses, but it is varied in different genera by the suppression of the upper palet, or even by the absence of both glumes, and the prolongation of the apex of one or both glumes or the lower palet into a bristle-like appendage, the awn. In the many-flowered grasses, of which hair grass (*aira*) will serve as a familiar illustration, there are two glumes, and within these two to several florets placed one above another upon a short axis (rachis), all of which except the upper one contain stamens and a pistil; the uppermost floret in the oat and in many other many-flowered grasses is neutral or imperfect; the lower palet in the oat is strongly many-nerved, and bears below its apex a strong and twisted awn. The nu-



FIG. 3.—Poa, spikelet.



FIG. 4.—Anthoxanthum, spikelet.

merous species of *poa*, including the meadow grasses, June grass, blue grass, &c., afford examples of many-flowered grasses in which the spikelets are compressed, the palets without awns, and more or less clothed with cottony hairs. The suborders of the family and the genera are founded upon various modifications of a very simple structure, some of which have been here indicated. In the sweet-scented vernal grass we have another modification; this grass appears to be one-flowered, but it is really three-flowered, with the upper and lower florets abortive and appearing one on each side of the perfect one as an awned empty palet. In barley (*hordeum*) and wheat (*tritium*) the spikelets are sessile in the excavations of a zig-zag stem or rachis; in the barley the spikelets are one-flowered, only the central one sometimes being fertile, as in two-rowed barley, and at others all three being fertile, when the spike or head becomes six-rowed, and the glumes are placed upon the side of the spikelets opposite the stem and form a bristle-like involucre. Grasses are annuals or perennials, and in some of the perennial species the root stock runs for a long distance underground, as in the couch grass, or "quack" (*tritium repens*), which often becomes a serious pest to the cul-

tivator. The root stocks, improperly called roots, possess great vitality, and if broken in the processes of cultivation, each joint is capable of producing a new plant.—The genera and species of grasses are numerous, and are estimated to form $\frac{2}{3}$ part of all known flowering

have species which are highly fragrant; the sweet-scented vernal grass (*anthoxanthum odoratum*) has a grateful vanilla-like odor, and to its presence is due the fact that the new-mown hay of the older states is so much more fragrant than that in more recently settled localities, where this grass has not yet become naturalized. Seneca grass or holy grass (*hierochloa borealis*), a native species, has a still more marked odor. Two or more species of *andropogon* furnish the oil-of-lemon grass or citronelle, used in perfumery; and the *vetiver* of the French comes from another species of the same genus.—*Permanent Meadow and Pasture Grasses*. The number of grasses sown by American farmers is limited; the common practice being to sow one or two sorts together with clover, mow it for hay for one or two



FIG. 5.—Sweet-scented Vernal Grass (*Anthoxanthum odoratum*).



FIG. 6.—Red-top (*Agrostis vulgaris*).



FIG. 7.—June or Blue Grass (*Poa pratensis*).

plants; they are found in all parts of the world. In temperate regions they are usually of low growth and carpet the surface of the earth, but toward the tropics they are taller and more tree-like in habit. The extremes in stature are striking when we contrast the minute *Phippsia* of the arctic regions, only an inch in height, with the tropical bamboo, which elevates its stem, strong enough to serve for a mast, to the height of 60 ft. The grasses are by far the most useful of all plants, the order including wheat, barley, oats, rye, maize, rice, millet, guinea corn, and sugar cane, besides numerous less known grains which furnish breadstuffs to aboriginal people in various parts of the world, and many species used for animal food in the form of hay. In enumerating the useful qualities and harmless character of grasses, an exception has been made in the case of darnel (*lolium temulentum*), which has long had the reputation of producing a poisonous grain; but, as will be seen under DARNEL, this is doubted. Aside from furnishing food, the economical uses of the grasses are many; some of the most important of these are given under BAMBOO; other grasses furnish materials for mats, cordage, the plaiting of hats, &c. One of the sources of paper stock has within a few years been found in the esparto grasses, *lygeum sparteum* and *stipa tenacissima*, of the shores of the Mediterranean. Some species, as the sand reed of our coasts, and especially the tussock grass (*dactylis cespitosa*) of the Falkland islands, are of essential service in retaining the blowing sands. Different genera

until the land is required for cultivation. They rarely sow grass expressly for making a permanent pasture; and as the grasses best for hay are not those most suited to grazing, our pastures are of an inferior character compared with those of England.

Timothy (*phleum pratense*) stands at the head of the hay-making grasses. (See TIMOTHY.) Next in order is red-top (*agrostis vulgaris*), also called in different localities fine-top, Rhode Island bent, Borden's grass, and in Pennsylvania and southward herd's grass, a name which in New York and New England is exclusively applied to *phleum* or timothy; it was formerly called English grass. It

grows from 1 to 2 ft. high, according to situation, and has a slender open panicle of small one-flowered spikelets, the reddish color of which suggested its best known common name. It varies greatly with the character of the soil, but in no case yields as largely as tim-



FIG. 8.—Orchard Grass (*Dactylis glomerata*).

othy, and its great value is in its permanence as a pasture grass. White-top (*agrostis alba*) often appears spontaneously in pastures, and is readily distinguished from red-top by its greenish white flowers; agriculturists are not agreed as to its value. Orchard grass (*dactylis glomerata*) is next in importance, as it is valuable for hay, and especially so for pasturage, and it will grow better than most other grasses in the shade of trees. It is a rather coarse species, grows 3 and even 5 ft. high, and bears a dense branching panicle, on which its several-flowered spikelets are arranged in crowded, one-sided clusters; it has a tendency to form tussocks, which unfits it for lawns; and for hay or pasturage the seed should be sown very thickly in order to produce a fine herbage. June grass (*poa pratensis*) is the most valuable of the poas; it is also known as smooth-stalked meadow grass, green grass, and Kentucky blue grass. By reason of its creeping root stocks it rapidly forms a dense turf, and is more valued for the pasture than the meadow; but it is used for hay, its after-math or second cutting being heavier than the first. It adapts itself to a wide range of country, and endures extreme cold without injury; it forms a large portion of the best pastures of Europe as well as of this country. Varying greatly in different soils and climates, it has received a number of local names besides those already given. It attains its greatest luxuriance in the limestone regions of Kentucky, where it spontaneously takes possession of the land, or "comes in," as the farmers say. The blue-grass pastures of Kentucky have long been celebrated, and at one time it was supposed that the grass was a peculiar one; but it is now well ascertained that it is only the common June grass growing in a peculiarly genial soil and climate. So variable is this species that the English writers on grasses recognize a half dozen or more named varieties. Other species of *poa* are found in our fields and pastures, the principal of which are the fowl meadow grass or false red-top (*P. serotina*), and the roughish meadow grass (*P. trivialis*), which resembles June grass, but blooms in moist meadows nearly a month later. The tall fescue (*festuca elatior*), though rarely sown, often appears in meadows and pastures; the sheep's fescue (*F. ovina*) and the hard fescue (var. *duriuscula*) grow upon sandy hard soils, and in some localities form the bulk of the sheep pasturage. The tall meadow-oat grass (*avena elatior*) was some years ago overpraised as "the grass of the Andes," and fell into disrepute; but it has latterly been regarded with more favor, and is valued by those who have cultivated it. Meadow foxtail (*alopecurus pratensis*) is highly prized as a pasture grass in England, and is sparingly introduced into this country; it has a resemblance to timothy, but the structure of the flowers is different, and it is much more soft to the touch. Sweet-scented vernal grass, the odor of which has been already mentioned, is common in

meadows, though it is rarely sown; while it adds to the enjoyment of the haying season, it is of no agricultural value. Under the name of rescue grass, a plant was much lauded in Europe a few years ago as something that would rescue fields from sterility and farmers



FIG. 9.—Buffalo Grass (*Buchloe dactyloides*).
1. Male. 2. Female.

from ruin; the seed was sold as *bromus Schraderi*, but it is probably a form of *bromus unioloides*, and of little value. Italian rye grass is a form of the variable *lolium perenne*, other varieties of which are known as Russell's, Pacey's, and Stickney's rye grasses; it is valuable for hay, pasturage, or soiling, especially on irrigated meadows.—*Annual Grasses*. Among those of this class grown for hay are Hungarian grass (*panicum [setaria] Germanicum*) and Italian millet (*P. miliaceum*), which are often useful in supplementing a short hay crop. The foliage of some of the cereal grains is used for forage, it being cut before the grain ripens and cured like hay; oat, rye, and maize are those principally grown.—*Grasses of Spontaneous Growth*. Bermuda grass (*cynodon dactylon*) is a native of Europe, Asia, and Africa, and is abundantly naturalized south of Pennsylvania. It is a low, much-branched perennial, creeping extensively by root stocks, and soon forms a dense mat that completely excludes all other vegetation. In most localities it is regarded as a troublesome weed, but it is of great value where other grasses will not grow for pasturage, and even for hay; in this country, at least, it is not known to perfect seed. Buffalo grass (*buchloe dactyloides*), in the prairies west of the Mississippi, extends from the British possessions to Mexico, and is the support not only of buffalo and deer, but the animals of the recent settler; it is one of the few examples of a dioecious grass, and the male and female plants are so unlike in their flowering parts that until within a few years they were regarded as belonging to distinct

genera; the pistillate or female flowers are enclosed by a bur-like woody involucre; it runs extensively by stolons, and forms a dense turf, the foliage of which is but a few inches high. Mezquite grass is often mentioned by travellers in the far southwest; like other local names in new countries, this is applied to quite different plants; it seems to be given to whatever grasses grow in the region of the mezquite tree, and species of *aristida*, *bouteloua*, and even the buffalo grass, have this name given to them by different persons. Grama grass is also praised by those who visit Spanish American countries, and comprises a number of species of *bouteloua*. Another indefinite name of travellers is "bunch grass," given to any kind that forms clumps or tufts; *festucas*, *boutelouas*, *triticeums*, and *ericocoma* all bear this name.—*Grasses regarded as Weeds*. One of the most troublesome weeds of the farmer and gardener is couch grass (*triticum repens*), already mentioned. Chess or cheat (*bromus secalinus*) is a pest of the grain fields, often so abundant from unclean seed as to induce ignorant farmers to believe that wheat really turns into chess. Dogs-tail or wire grass (*eleusine indica*) is a common weed in the streets of towns and villages, and encroaches upon the farms near them. Barnyard grass (*panicum crus-galli*) is common in waste places, and where the soil is rich grows with great luxuriance, but being an annual is easily subdued. The crab or finger grass (*panicum sanguinale*) is late in summer one of the most annoying of the gardener's pests, as it roots at every joint, and unless eradicated when very young is troublesome.—*Marsh Grasses*. Along the margins of rivers, especially where salt and fresh water meet, there are often wide tracts covered with verdure and known as meadows or marshes. When the growth is sufficiently fine these meadows are mowed, and the product, known as marsh hay or salt hay, is largely used for bedding animals and for mulching. Often a large share of this hay consists of grasses, but frequently it is made up of rushes and sedges; a small rush (*juncus Gerardi* and perhaps others), called "black grass," often covers large tracts. Among the grasses proper found in such localities are species of *spartina*, *glyceria*, and *phragmites*.—*Ornamental Grasses*. Several tropical grasses are grown as greenhouse plants, and in late years the taste for cultivating the hardier kinds in the open border has greatly increased. Some of these, like *erianthus Ravenæ* and the pampas grass (*gynerium argenteum*), are grown for their stately appearance; their flower stalks grow to the height of 12 ft., and their long leaves form large clumps of graceful outline. Other species are cultivated for the beauty of their flowers, which are dried for making ornamental bouquets. In some of the horticultural establishments of Germany bouquets of dried grasses are an article of export.—Very many kinds of grass not here enumer-

ated are more or less well known, the more important of which are treated in separate articles, as CANARY GRASS, FEATHER GRASS, MILLET, REED, &c. Many plants commonly called grasses do not belong to the grass family. In some agricultural works, clover, lucerne, sainfoin, and other forage plants are incorrectly classed as grasses; these will be found under their proper titles.—The most complete general scientific treatises upon grasses are Kunth's *Enumeratio Plantarum* (5 vols., Stuttgart, 1833-'50) and Steudel's *Synopsis Graminearum* (Stuttgart, 1855). The species east of the Mississippi are described in Gray's "Manual of the Botany of the Northern United States" (New York, 1867) and Chapman's "Flora of the Southern United States" (New York, 1860); those of the far western portions of our territory are scattered through various reports and memoirs. Flint's "Grasses and Forage Plants" (Boston, 1867) is the principal American work upon the agricultural grasses.

GRASSHOPPER, a name properly applied to orthopterous insects of the family *locustada*. Some European entomologists assign the generic name *locusta* to the grasshopper; the *sauterelles* of the French include both locusts and grasshoppers; great inconvenience has arisen from this confusion of names, which will be avoided by calling the grasshoppers *locustadæ*, and the locusts *acrydiæ*. The *locustadæ* are characterized by having long antennæ, four joints to all their feet, wing covers sloping downward at the sides of the body, and the end of the abdomen in the females provided with a projecting sword-shaped piercer; the jaws are formed for mastication; the upper wings are thick and opaque, overlapping a little on the back, this portion forming a long triangle, traversed in the males by strong projecting veins, between which are thin, transparent, membranous spaces; the under wings are thin and folded in plaits like a fan; they undergo a partial transformation, the larvæ and pupæ being active, voracious, and wingless; they are injurious to vegetation in all their forms. The males emit a shrill sound produced by the friction of the overlapping portions of the wings, intensified by the vibration of the air contained in the internal air sacs, and its action upon a complicated series of valves and membranous plates about the origins of the wings and legs. Most grasshoppers are of a green color, more or less resembling the leaves upon which they feed; they are more active by night than by day; when taken, they emit from the mouth a dark-colored fluid, known by every school boy as "molasses;" they do not associate together, nor migrate from place to place in large numbers, as do the locusts proper. Some live upon grass and herbaceous plants, and the females lay their eggs in the ground in holes made by their nearly straight piercers; the eggs are elongated, ellipsoidal, very numerous, from one fourth to one fifth of an inch long, and

covered with a thin varnish-like film. Others live upon trees and shrubs, like the katydid; their wings and covers are broader, and they deposit their eggs on the branches of trees in regular rows, having shaved off the bark with their short and curved piercer. The legs are



Oblong Leaf-winged Grasshopper (*Phylloptera oblongifolia*).

three pairs, the posterior being much the longest and capable of performing the jumps whence these insects derive their name; they all end in elastic hooks. The flight of the grasshopper is short, unsteady, and noiseless, compared with that of the locust. The American katydid (*platyphyllum concavum*, Harris) will be described under that title. Other native grasshoppers are: 1. The spotted wingless grasshopper (*phalangopsis maculata*, Harris), pale yellowish brown, with small light spots on the darker back, smooth and shining, with arched back, from half an inch to about an inch long; it is common, under stones and sticks in the woods, has the short thick body and stout hind thighs of a cricket, and is entirely destitute of wings. 2. The oblong leaf-winged grasshopper (*phylloptera oblongifolia*, De Geer) is of a brilliant green, with very delicate wings, the under extending far beyond the upper; the body is only about an inch long, but to the end of the wings it often measures three inches; in its perfect state it is found upon trees in September and October;



Narrow-leaved Grasshopper (*Phaneroptera angustifolia*).

during flight it makes a whizzing noise. 3. The curved-tailed grasshopper (*P. curvicauda*, De Geer), of the middle and southern states, is a larger species, with wing covers broadest in the middle. 4. The narrow-leaved grasshopper (*phaneroptera angustifolia*, Harris) is green,

with wing covers rounded at the tips and shorter than the wings, a short bent piercer, and in the male a long tapering projection from the under side of the body; it measures in the body three quarters of an inch, and to the end of the wings about an inch and three quarters; it comes to maturity early in September. 5. The common meadow grasshopper (*orchelimum vulgare*, Harris), so numerous near the end of summer at different ages, is of a general green, with a brown stripe on the top of the head and thorax; it measures at maturity about three quarters of an inch to the end of the body, and a quarter of an inch more to the end of the semi-transparent wing covers; the shrilling organs consist of a transparent glassy spot in the overlapping portion of each wing cover, which is larger and stronger than in other grasshoppers; the hindmost thighs are smooth, there are two spines on the middle of the breast, and the antennæ extend beyond the end of the hind legs. 6. The sword-bearer grasshopper (*conocephalus ensiger*, Harris) has the head conical, extending to a blunt point between the eyes, and a long, straight, sword-shaped piercer; it measures an inch to the end of the body, and



Common Meadow Grasshopper (*Orchelimum vulgare*).

an inch more to the end of the wing covers; it is pale green, with whitish head, and pale brownish green legs and abdomen.—The young grasshopper comes from the egg without wings; passing through several moultings, the body increases and little stump-like wings appear; the wings gradually become longer with each change of skin, the insect hopping about by means of its muscular hind thighs; after ceasing to grow, the wings are perfect organs of flight, and the grasshopper enters upon its short life; the song by degrees becomes less, the body shrivels, the legs wither, the appetite ceases, and in three or four weeks the whole number are dead. The larvæ remain in the earth or wherever the eggs are deposited all winter, and are hatched in the spring; they are voracious as larva, pupa, and perfect insect, and in all these stages are eagerly devoured by fowls, especially turkeys.—The green grasshopper of Europe (*L. viridissima*, Latr.) is two inches long, of a fine green without spots. The *L. verrucivora* (Fabr.) is green, with the wing covers spotted with brown and black; it bites severely, and the Swedes submit their warts to its mandibles, asserting that after its bite the warts quickly disappear.

There are many other species in different parts of the world, but none merit attention for their destructiveness in comparison with the locusts; war is rarely waged against grasshoppers, as their natural enemies, birds, domestic fowls, and sand wasps, keep them down in proper limits.

GRASSMANN, Hermann Günther, a German mathematician, born in Stettin, Prussia, April 15, 1809. His father was professor of mathematics in the gymnasium of Stettin and the author of several mathematical text books. Hermann studied theology and mathematics, and from 1834 to 1852 was a teacher in the *Otto-Schule* in Stettin, when he succeeded his father as professor of mathematics in the gymnasium. In 1844 he published the first part of *Die Wissenschaft der extensiven Grösse, eine neue mathematische Disciplin*. This part also bore the special title *Die lineale Ausdehnungslehre, ein neuer Zweig der Mathematik, dargestellt und durch Anwendungen auf die übrigen Zweige der Mathematik, wie auch auf die Statik, Mechanik, die Lehre vom Magnetismus und die Krystallonomie erläutert*. In the preface to this work he gave a short account of his discovery, and declared his intention to make its development and application the chief object of his life. He further developed his theory in *Geometrische Analyse* (1847), which obtained the prize offered by the Prince Jablonski scientific society of Leipzig, and in articles in Crelle's mathematical journal treating the higher classes of curves. In 1853 Cauchy published in the *Comptes rendus* of the French academy a method of resolving algebraical equations and other problems by means of certain symbolical quantities, which he called *clefs algébriques*. The method was identical with that employed by Grassmann, and the latter immediately addressed a "claim of priority" to the academy. A committee was appointed to examine the question, but it never made any report, and Cauchy abruptly broke off the publication of his articles. In 1862 Grassmann completed the development of his theory by publishing *Die Ausdehnungslehre vollständig und in strenger Form bearbeitet*. This work is in strict mathematical form, after the model of Euclid's Elements, consisting almost entirely of propositions and demonstrations. In it he develops the connection of his theory with every branch of mathematics, from arithmetic to the integral calculus, and discusses its application to geometry. The profoundly metaphysical character of his first work and the exceedingly abstract form of the last, together with the total absence of all geometrical figures and all simple illustrations, have very much retarded the progress of his doctrine among professed mathematicians, and have prevented its comprehension by any others. It has many striking analogies to the quaternions of Sir William Rowan Hamilton. There can be little doubt that the theory of Grassmann, or one essentially the same, and only differing

somewhat in form, will in time supersede the whole system of analytical geometry as founded by Descartes and so greatly developed by the labors of subsequent mathematicians. Grassmann has been a frequent contributor to the leading scientific journals of Germany, and has published text books on various branches of science. He has an extensive knowledge of languages, published in 1870 a work on the German names of plants, and is now (1874) engaged in publishing a Sanskrit-German dictionary to the *Rig Veda*.

GRASS TREE, one of the English names given to plants of the genus *xanthorrhæa*, which are also called grass-gum trees and black-boys. They belong to the order *liliacea*, and are especially distinguished by their crowns of long, pendulous, grass-like leaves, from the centre of which arises a long stem bearing at its summit a dense flower spike looking somewhat like a large cat-tail (*typha*). Some species have very short stems, while others have trunks 6 to 18 ft. high, which, with their singular tufts of leaves, form a striking feature in the Australian landscape. *X. arborea*, *X. australis*, both arborescent, and *X. hastilis*, nearly stemless, are the best known species, as they are the principal ones in cultivation as ornamental greenhouse plants. Two resins obtained from these plants have been known for some time; one is yellow and called Botany Bay resin and gum acaroides, and the other red, resembling dragon's blood, and known as black-boy gum. They are aromatic, contain cinnamic and benzoic acids, and have the general properties of the balsams proper. No important use seems to have been found for these products.

GRATIAN (AUGUSTUS GRATIANUS), emperor of Rome, born in Pannonia in 359, slain at Lugdunum (Lyons) in 383. His father, Valentinian I., bestowed upon him the title of Augustus in his childhood, but when he died in 375 the officers of the army compelled Gratian to give his half brother Valentinian II., then a young child, a share in the western empire, the East being in the hands of his uncle Valens. Gratian received Gaul, Spain, and Britain, and reigned over Italy, Illyricum, and Africa as guardian of his brother. Great severity marked the beginning of his reign. When the East was attacked by the Goths, Gratian was delayed in aiding his uncle by another incursion of barbarians from the north; and when he finally marched to his rescue, he received the news of his defeat and death (378), which made him the ruler of both parts of the empire. In the next year he ceded the East to the younger Theodosius. Several wars with barbarous tribes on the Rhine and Danube were successfully terminated, and Gratian, who is praised by both Christian and pagan historians as just, moderate, and virtuous, now enjoyed a few years of repose at his residence in Milan, where he became the friend of St. Ambrose. By the confiscation of the property of the temples and the abolition of the privileges of

the priests, he greatly contributed to the downfall of paganism. A military rebellion, which broke out in Britain under Maximus, and spread to Gaul, deprived him of his throne and life.

GRATIOT, a central county of the S. peninsula of Michigan, drained by Pine and Maple rivers; area, 576 sq. m.; pop. in 1870, 11,810. It has an undulating surface and a productive soil, partially covered with pine timber. The chief productions in 1870 were 127,111 bushels of wheat, 81,655 of Indian corn, 64,923 of oats, 95,354 of potatoes, 306,436 lbs. of butter, 44,903 of wool, and 13,297 tons of hay. There were 2,072 horses, 3,288 milch cows, 4,748 other cattle, 11,536 sheep, and 4,890 swine; 4 flour mills, and 13 saw mills. Capital, Ithaca.

GRATRY, *Auguste Joseph Alphonse*, abbé, a French theologian, born in Lille, March 30, 1805, died at Montreux, Switzerland, Feb. 6, 1872. In 1841 he was appointed director of the college of Ste. Barbe, Paris, and in 1846 chaplain of the superior normal school. In 1851 a controversy with his colleague, M. Vacherot, led to their resigning their positions. Gratry now founded, in conjunction with the abbé Petetot, a society of priests called "Oratory of the Immaculate Conception," and devoted himself in an especial manner to the conversion and instruction of the Parisian youth. In 1861 he was appointed by Bishop Dupanloup vicar general of Orleans, and in 1863 became professor of moral theology in the Sorbonne. On the publication of his *Cours de philosophie* (1855-'7) he was hailed as a valuable auxiliary by the ontologists. In 1864 he vehemently attacked Renan and the whole rationalistic school; and in 1867 he was elected a member of the French academy, chiefly, it is thought, in consideration of his three works, *Paix, méditations historiques et religieuses* (1862), *Sources, conseils pour la conduite de l'esprit* (2 vols. 8vo, 1861-'2), and *Commentaires sur l'évangile de Saint Matthieu* (1863). In 1869 his connection with Père Hyacinthe and the "International League of Peace" drew on him the censure of the superior of the Oratory, from which body he thereupon withdrew. In 1870 he published two letters on the position of parties in the council of the Vatican, which he retracted in December, 1872, in a letter to the new archbishop of Paris, Guibert. His principal works, besides those above mentioned, are: *Philosophie du Credo* (1861); *Jésus-Christ, lettres à M. Renan* (1864); *Les sophistes et la critique* (1864); *Henri Perreye* (1866); and *La morale et la loi de l'histoire* (2 vols. 8vo, 1869).

GRATTAN, *Henry*, an Irish statesman and orator, born in Dublin, July 3, 1746, died in London, May 14, 1820. His father, a barrister and a Protestant, was for many years recorder of Dublin and also a member of the Irish parliament. Henry entered Trinity college, Dublin, in 1765, and graduated with distinction in 1767, after which he removed to London and became a student in the Middle Temple. His admiration for the eloquence of Lord Chat-

ham determined him to become an orator. He was admitted to the Irish bar in 1772, and in 1775 entered the Irish parliament as representative of Charlemont. He at once joined the opposition, and united with Flood and the leading patriots of the day in endeavoring to obtain free trade for Ireland. On April 19, 1780, he introduced and supported with great eloquence the famous declaration of right, denying the power of the British parliament to legislate for Ireland. His motion was lost, but he became the idol of the Irish people. He fired their national spirit, and through his influence the volunteer bands assembling from all parts of Ireland were swelled to the number of 80,000. These volunteers held a meeting at Dungannon in February, 1782, and passed unanimously the resolution drawn up by Mr. Grattan, that "a claim of any body of men, other than the king, lords, and commons of Ireland, to make laws to bind this kingdom, is unconstitutional, illegal, and a grievance." On April 16, 1782, he repeated in the house of commons his motion for a declaration of Irish right. The resolutions were carried by an overwhelming majority. Mr. Fox decided instantly to yield, and brought in a bill for repealing the act (6 George I.) by which the British parliament claimed the right to bind Ireland by British laws. Grattan was now the most popular man in Ireland, and parliament proposed to vote him £100,000 "as a testimony of the national gratitude for great national services." It was only at the earnest request of his friends that he agreed to accept half the amount. During the following sessions of parliament he found a bitter and sarcastic opponent in Flood, who encouraged the story which had been set on foot, that Grattan having received his pay had ceased to be a patriot. In 1785, by his opposition to the propositions regarding the trade between Great Britain and Ireland, known as Ord's propositions, he regained his popularity. In 1790 he was returned to parliament by the city of Dublin. On the arrival in 1795 of Earl Fitzwilliam, he associated himself with that nobleman in originating plans for the peace and prosperity of his native country. After the earl's recall dissensions arose, and the society of United Irishmen proposed to form a republic, and opened intercourse with France to gain help. Grattan, after advising conciliatory measures in vain, withdrew from parliament. When Mr. Pitt proposed measures for uniting Great Britain and Ireland, he again obtained a seat in parliament as member for Wicklow, for the express purpose of opposing this measure; but when the union had been effected he entered the imperial parliament as representative of the borough of Malton in 1805, and of Dublin in 1806. In opposition to the corporation of his native city, he advocated Catholic emancipation, and undertook a journey to London, while in feeble health, to present a petition from the Catholics to the house of commons. When

his friends remonstrated, he replied that he would be happy to die in the discharge of his duty, and he did in fact sink under the exertion soon after his arrival. Grattan was below medium stature and exceedingly unprepossessing in appearance. His oratory was impassioned, and he was often entirely overcome by his subject. His private character was without a blemish. His speeches were edited by his son Henry Grattan (4 vols., London, 1822), and a selection from them by D. O. Maddy (Dublin, 1845). A volume of his miscellaneous works appeared in 1822, and his "Life and Times" by his son in 1839-'46 (5 vols., London).

GRATTAN, Thomas Colley, an Irish novelist, born in Dublin in 1796, died in London, July 4, 1864. He studied law, and procured a commission in the army, but renounced both professions on his marriage, and afterward resided in France. At the age of 25 he published "Philibert," a metrical romance, which was a complete failure. He next became a contributor to various magazines and reviews, and in 1823 published in two volumes the first series of "Highways and Byways." A second series appeared in 1824, and a third in 1827, each in three volumes. Establishing himself in Brussels, he wrote a number of works, of which "Traits of Travel" (3 vols., 1829), "The Heiress of Bruges" (4 vols., 1830; new ed., 3 vols., 1834-'49), "History of the Netherlands" (1830), "Jacqueline of Holland" (1842), and "Legends of the Rhine" (3 vols., 1849), are the best known. Having actively supported the candidacy of King Leopold in the Belgian revolution of 1830, he was at the request of that sovereign appointed in 1839 British consul to Boston, which office he resigned in 1852, to accept one in the queen's household. His "Civilized America" (2 vols., London, 1859) is a spiteful record of his experiences in North America. His last work was "Beaten Paths" (2 vols., 1862).

GRATTONI, Severino, an Italian engineer, born at Voghera, Dec. 7, 1816. After extensive studies, he was from 1845 to 1851 director of an observatory under Plana, and formed the acquaintance of Cavour, who consulted him on public works, especially on the project of piercing Mont Cenis. Grattoni, being elected to the chamber of deputies, supported Cavour's policy, and was soon called upon, together with Sommeiller and Grandis, to devote himself to the Mont Cenis tunnel scheme. While Sommeiller supplied the chief inventive power, and Grandis a sound judgment on theoretical questions, Grattoni, by his skill, energy, and perseverance, became the organizing genius of the work, which was completed in September, 1871.

GRATZ, or Grätz, a town of Austria, capital of the province of Styria, on the Mur, 90 m. S. S. W. of Vienna; pop. in 1870, 80,732. It consists of the town proper, which is on the left bank of the river, and is fortified, and of four suburbs connected with the town and

with each other by bridges. The chief public buildings are a magnificent Gothic cathedral erected by the emperor Frederick III. in 1456; St. Catharine's chapel, built as a mausoleum by Ferdinand II., whose remains repose here; the Landhaus, where the diet of Styria holds its sessions; the old palace of the Styrian dukes; the university, founded in 1586, subsequently abolished, restored in 1827, and having in 1873-'4 70 professors and 975 students, with a library of about 70,000 volumes and 7,500 MSS.; the Johanneum, an institution established in 1811 by Archduke John for the encouragement of the arts, sciences, and manufactures of Styria; and the refectory or *convict*, the largest building in Gratz, formerly belonging to the Jesuits, but now a collegiate school. It is the seat of a Roman Catholic bishop, who bears the title of bishop of Seckau. There are 22 Catholic churches, a Protestant church, and 10 convents. The principal manufactures are cotton, woollen, silk, hardware, leather, and paper.

GRAUBÜNDEN, or Granbündten. See GRISSONS.

GRAUDENZ, a fortified town of Prussia, in the province of West Prussia, on the Vistula, 60 m. S. of Dantzic; pop. in 1871, 15,559. It has a Protestant and five Roman Catholic churches, a convent, a gymnasium, a normal school, and two hospitals. There are manufactures of cloth, tobacco, and carriages, several breweries and distilleries, a considerable trade in cloth and corn, some shipping, and four annual fairs. The fortress was built by Frederick the Great, and became famous in 1807 for its brave defence by Courbière.

GRAUN, Karl Heinrich, a German composer, born in Wahrenbrück, Saxony, in 1701, died in Berlin, Aug. 8, 1759. He studied music in Dresden, subsequently became tenor and composer to the opera house in Brunswick, and in 1740 was appointed by Frederick the Great his chapelmaster, a position which he occupied during the remainder of his life. He was the author of 30 operas, and an immense number of cantatas and miscellaneous pieces. His best works are the oratorio *Der Tod Jesu*, and his *Te Deum*.

GRAVE CREEK. See MOUNDSVILLE.

GRAVEL, small stones, commonly intermixed with sand, and sometimes with clayey or calcareous earth. Such a mixture constitutes the principal portion of the drift formation; and where this prevails, the surface of the country is often covered to unknown depths with deposits of sand and gravel. It forms hills throughout New England, and nearly the whole of Long Island is covered with it. (See *DILUVIUM*.) It is of more recent formation wherever rocks, especially the granitic, are comminuted by joint action of atmospheric and fluvial agents, and their materials are gathered in the bed and banks of swift running streams. On the beaches of seas and lakes, the gravel, piled up in beds of coarse pebbles and washed clean of sand and all earthy matters, is called shingle.

GRAVEL, substances consolidated and precipitated from the urine within the body, in certain diseased conditions of the system, differing from calculi by their small size, and generally voided without surgical interference. (See **CALCULI**.) The appearance of gravel is important as evidence of a disposition to calculous deposits, and as indicating the proper treatment. When the disposition exists, anything which obstructs the passage of urine favors the precipitation of gravel. There are three kinds of gravel, as there are three principal forms of calculi, viz.: the lithic, the oxalic, and the phosphatic. Lithic or uric acid, a highly nitrogenous compound, exists normally in the urine in combination with soda; if the urine be abnormally acid, the lithic acid will be precipitated in a crystalline form, constituting the lithic or red gravel; lithic acid when pure is white, but in human urine it assumes the tint of its coloring matter, which causes it to look like Cayenne pepper. The urine containing this gravel is generally acid, high-colored, scanty, but clear; in what is called a "fit of the gravel," this acid is precipitated in large quantity, accompanied by fever, pains shooting from the loins to the bladder, frequent and scalding micturition, &c. The causes which predispose to the excessive formation of lithic acid have been detailed in the article *Gout*, with which disease gravel is intimately connected; it will be sufficient to say here that the use of highly nitrogenous food and stimulating drinks, and sedentary or slothful habits, are very likely to induce both gout and lithic acid gravel. Though not unfrequently occurring in children, gravel is most common between the ages of 40 and 65; it is comparatively rare in warm climates, or in persons living chiefly on vegetable food. On the principles of Liebig, the great indication for the treatment of the red gravel is to promote the action of oxygen on lithic acid so as to cause its conversion into urea and carbonic acid, and its consequent escape from the system through the urine and the perspiration; in other words, to take in an increased supply of oxygen by exercise in the open air, by preparations of iron, and by the nitro-muriatic acid; to moderate the quantity of highly nitrogenous food, avoiding that containing much starch and sugar, as well as malt and fermented liquors; to secure a healthy action of the skin by suitable clothing and attention to cleanliness; to remove all intestinal obstructions, and to neutralize acidity, if necessary, by the administration of alkalies.—The lithic acid gravel may be regarded as the sign of an inflammatory or congestive habit, but the next form, or the oxalic acid gravel, belongs to an irritable or nervous constitution, and is usually accompanied by a dry skin, dyspepsia, boils, carbuncles in advanced life, and nervous exhaustion or despondency; the urine is transparent, pale greenish yellow, of moderate specific gravity, and free from sediments, but containing minute crystals of oxalate of lime. The

causes of this diathesis are such as produce dyspepsia, nervous debility, and hypochondriac diseases: residence in malarious districts, and unwholesome vegetable food. The treatment is very similar to that for lithic acid gravel, it being remembered that in this case the system craves less oxygen; distilled water is advised in order that lime may not in this way be introduced into the system and endanger the formation of mulberry calculi; alkalies, with ammonia, tonics, and the mineral acids, are required according to circumstances. Oxalate of lime deposits, however, are usually much less abundant and less irritating than those of uric acid, and, as a general rule, are less important indications of an unhealthy state of the system. The white gravel may be either the ammoniaco-magnesian phosphate or the phosphate of lime, or the mixture of the two. The earthy phosphates are naturally held in solution by the acid reaction of the urine; and when this is neutralized or replaced by an alkaline reaction, these phosphates are precipitated in the form of a white amorphous powder. If the urine become ammoniacal, a new compound is formed, namely, the triple phosphate of magnesia and ammonia. This substance has the form of three-sided prismatic crystals, sometimes large enough to be distinguished by the naked eye. The phosphatic diathesis is generally seen in pale and weak persons, complaining of nervous exhaustion, as Dr. Prout maintains, on account of the great consumption of phosphorus in nervous diseases; it may be produced by excessive fatigue of body or mind, intense study, unwholesome food, weakening medicines, and chronic urinary affections. The treatment should consist of tonics.

GRAVELINES (Flem. *Gravelinghe*; Ger. *Gravelingen*), a fortified seaport town of France, in the department of Le Nord, near the mouth of the Aa, 10 m. W. S. W. of Dunkirk; pop. in 1866, 6,510. It contains a handsome market place, a church built in the 16th century, and a modern town hall, and has an extensive coasting trade and active fisheries. Cheese, butter, and eggs are exported; sail cloth and linens are manufactured, and there is some ship building. The town was founded in 1160 by Count Thierry of Alsace and Flanders. A famous victory was achieved here by the Spaniards under Egmont over the French under the marshal de Thermes, July 13, 1558. It was annexed to France by the treaty of the Pyrenees (1659). Louis XIV. had new fortifications constructed, designed by Vauban.

GRAVELOTTE, a village of Germany, in Alsace-Lorraine, on the Moselle, 8 m. W. of Metz; pop. 700. Here on Aug. 18, 1870, the first and second German armies, commanded by Gen. Steinmetz and Prince Frederick Charles under King William in person, obtained a great victory over the French under Marshal Bazaine. The battle of Gravelotte decided the fate of Metz. It was probably the bloodiest and the

most hotly contested of the war, the loss of the Germans being about 20,000 in killed and wounded, and that of the French, who occupied superior positions and acted on the defensive, about 13,000.

GRAVES, a S. W. county of Kentucky, bordering on Tennessee, and drained by Mayfield creek and Obion river; area, 515 sq. m.; pop. in 1870, 19,398, of whom 2,329 were colored. It is traversed by the Paducah and Memphis railroad. The surface is level and the soil generally productive. The chief productions in 1870 were 96,453 bushels of wheat, 842,445 of Indian corn, 24,424 of oats, 14,952 of Irish and 24,259 of sweet potatoes, 158,380 lbs. of butter, 4,774,195 of tobacco, and 187 bales of cotton. There were 3,935 horses, 2,311 mules and asses, 3,681 milch cows, 4,404 other cattle, 13,876 sheep, and 31,570 swine; 1 woollen factory, and 2 wool-carding and cloth-dressing establishments. Capital, Mayfield.

GRAVES, Robert, an English engraver, born May 7, 1798, died in London, Feb. 28, 1873. He was the eldest son of Robert Graves, a noted connoisseur of rare prints, and the grandson of a printseller. Among his latest productions were a series of portraits from the works of Sir Joshua Reynolds and Gainsborough, and his last work was the portrait of Charles Dickens, after Frith.

GRAVESANDE, Willem Jakob van 's, a Dutch philosopher, born in Bois-le-Duc, Sept. 27, 1688, died in Leyden, Feb. 28, 1742. He published at the age of 18 an essay on perspective, and a philosophical thesis on suicide. After completing his studies in the university of Leipsic in 1707, he was admitted to the bar at the Hague, where he wrote for the *Journal Littéraire* an examination of Fontenelle's "Geometry of the Infinite," a dissertation on the construction of the air pump, one concerning the force of bodies, in which he embraced the opinion of Leibnitz against that of Newton, and dissertations upon the motion of the earth, &c. In 1717 he was appointed professor of mathematics and astronomy in the university of Leyden, and exchanged his chair in 1734 for that of philosophy, which he held till his death. His philosophical writings are eclectic in character, combining portions of the doctrines of Locke, Descartes, and Leibnitz. His principal works are: *Physices Elementa Mathematica* (2 vols. 4to, the Hague, 1720-'23); *Matheseos Universalis Elementa* (8vo, Leyden, 1727); and *Introductio ad Philosophiam, Metaphysicam et Logicam* (Leyden, 1736-'7).

GRAVESEND, a municipal borough, town, and river port of Kent, England, on the right bank of the Thames, 21 m. E. by S. of London; pop. in 1871, 21,183. The principal public edifices are the town hall, parochial church (where Pocahontas is buried), literary institution, and theatre. Ship building is carried on to a considerable extent, but the chief trade arises from supplying outward-bound ships with stores and clothing. Gravesend is the limit of the port

of London; inward-bound vessels stop here for examination by the customs officers.

GRAVIER, Jacques, a French missionary in America, died in 1708. Soon after his arrival in Canada, in 1684, he was sent to the Illinois region, where he followed up the labors of Marquette and Allouez among the Kaskaskias and other bands of the Illinois, and became the real founder of the mission, which he directed for many years, meeting much opposition from the medicine men, and receiving at their hands a wound which ultimately caused his death. He compiled a grammar of the Illinois, which was highly esteemed and formed the basis of all subsequent works of the kind. When Iberville began the settlement of Louisiana, the Illinois prepared to go down the Mississippi; but the Kaskaskias, the first to move, were induced by Gravier to halt at the place which now bears their name. He went down to confer with Iberville, and has left a journal of his canoe voyage. He descended again in 1706, and went to Europe. He returned in February, 1708, but must have reëmbarked, as he died at sea in April. Of his writings the following have been printed: *Relation de ce qui s'est passé dans la mission de l'Immaculée Conception au pays des Illinois 1693-'4* (8vo, New York, 1857); *Relation ou Journal du voyage en 1700 depuis le pays des Illinois jusqu'à l'embouchure du Mississippi* (1859); *Lettre sur les affaires de la Louisiane, fév. 23, 1708* (1865).

GRAVINA, a town of S. Italy, in the province and 36 m. S. W. of the city of Bari, on a river of the same name, an affluent of the Bradano; pop. about 14,000. It is the seat of a bishop, and has five churches and a gymnasium. It was unsuccessfully besieged by the Saracens in 975.

GRAVINA, Giovanni Vincenzo, an Italian jurist, born at Roggiano, Jan. 20, 1664, died in Rome, Jan. 6, 1718. Devoting himself to civil and canon law, he went to Rome in 1689, published several brief works on morals and literature, and in 1695, having collected 15 of his friends in his garden, formed the academy of the Arcadians. In 1699 he was appointed professor of civil law in the college of La Sapienza, and in 1703 of canon law. He soon after published his works on the "Origin of the Civil Law" and on the "Roman Empire." A schism took place in 1711 in the academy of the Arcadians, and Gravina and his friends withdrew and founded the Quirina academy. He was the adoptive father of Metastasio.

GRAVITY, or *Gravitation* (Lat. *gravitas*, weight), in physics, the tendency of bodies toward each other or toward a centre of attraction. In the article *ASTRONOMY* we have considered the history of the discovery of the great law of gravitation, and have sketched the application of the law to elucidate a variety of problems of interest connected with the motions of the celestial bodies; in the article *EARTH* we have considered the application of this law to determine the mass and figure of the earth; and in dealing with the lunar mo-

tions, we shall have to consider more in detail the perturbative action of gravity. In the present place, therefore, we limit ourselves to the consideration of terrestrial gravity in its effects on bodies upon or close to the surface of the earth. There are two ways in which the action of gravity at any station can be measured. We can examine its effect in causing bodies to have weight; this is the statical action of gravity. Or we can consider its effect upon bodies let fall to the earth; the velocity acquired in a given time affords the means of estimating this, the dynamical action of gravity. For many reasons the latter is the more convenient method of measuring it. The balance, the readiest and most trustworthy method of weighing bodies, obviously fails us when the measurement of the effect of gravity is in question, since the weight and the body weighed are equally under its influence. Nor can the spring balance be trusted for comparing the action of gravity at different stations, even though the utmost precaution has been exercised in freeing the instrument from the disturbing influences of differences or changes of temperature. No difficulties of this sort attend the dynamical method of measuring gravity; because bodies of different specific gravity, or the same body in different conditions of temperature, will fall (*in vacuo*) through the same space in the same time under the influence of gravity. The resistance of the air may indeed be neglected where the difference of specific gravity is very small, as in the case of the same mass of metal at different temperatures. The method of measurement here indicated is however comparatively rough. It was that used by Galileo to determine the time of fall of bodies under the influence of gravity, and by means of the mechanical arrangement called Atwood's machine it can be applied to obtain a fair approximation to the velocity acquired in a given time. But for all delicate researches the pendulum is employed. It is known that when a pendulum swings in a short arc its rate of swing is appreciably constant (though the small arc should vary), and depends on the length and figure of the pendulum and the action of gravity. Contrivances have been invented by which the true rate of swing at any place, for a pendulum of known figure, can be most accurately ascertained. This being effected, it becomes possible to compare the action of gravity at different terrestrial stations.—Gravity varies on the earth's surface owing to two principal causes. In the first place, the earth is rotating, and every point on its surface therefore has a tendency (constantly overcome by gravity) to move in a straight line tangent to the earth's surface. This tendency is commonly called the centrifugal force due to the earth's rotation; an objectionable mode of expression, because no force properly so called is in question. The tendency is mere inertia. If the tendency were the same at all stations, gravity would

be uniformly affected, and no difference would accrue; but the tendency is greatest at the equator, where the motion is most rapid, and diminishes thence to the poles, where it is zero. The action of gravity in producing weight or in causing the fall of a body is obviously diminished by this tendency; and being most diminished at the equator, gravity is there least on this account, and gradually increases toward the poles. It is estimated that, so far as this cause alone is concerned, gravity at the equator should be less than at the poles by $\frac{1}{235}$ part. But secondly, owing to the same cause (the rotation of the earth), the terrestrial globe is not a perfect sphere, but is compressed at the poles. Hence a body placed at a pole of the earth is nearer to the centre of gravity than a body placed at the equator; and though this cause alone would not suffice to render the action of gravity greater on the body at the pole, since at the bottom of a mine gravity may be and usually is less than at the mouth (see EARTH), yet under the actual circumstances a body at the pole is on the whole brought under the more effective action of gravity. A complete mathematical comparison of the attractions under the two conditions shows that gravity at the equator, so far as the cause we are now considering is concerned, is less than gravity at the poles by about $\frac{1}{235}$. Combining the two effects, we obtain for the total decrease of gravity at the equator: $\frac{1}{235} + \frac{1}{235} = \frac{2}{235}$. In other words, if gravity at the poles be represented by 195, gravity at the equator will be represented by 194. Minor causes exist, which however need not here be taken into consideration. We may simply mention that they arise from the non-homogeneity of the earth's substance (near the place of observation), as the existence of cavities, of great masses of unusual density, and so on. The following table shows the results obtained by Capt. Kater in different parts of the British isles:

PLACE OF OBSERVATION.	Latitude.	Longitude.	Vibrations in a mean solar day.	Length of the pendulum vibrating seconds.
Unst	60° 45'	28° 01''	86,096·90	39·17146
Portsoy	57 40	58·65	86,086·05	39·16159
Leith Fort	55 53	40·80	86,079·40	39·15534
Clifton	53 27	43·12	86,068·90	39·14600
Arbury Hill ...	52 12	55·32	86,065·05	39·14350
London	51 81	8·40	86,061·52	39·13923
Shanklin Farm.	50 87	23·94	86,055·07	39·13614

Deducing from these values the velocity acquired by a body in falling, Capt. Kater found that a body falling at Leith Fort would acquire in one second a velocity of 32·207 feet per second; and that the variation in this velocity for one degree of difference of latitude is at Leith only ·0000832 of its own amount. The following table gives the length of the seconds pendulum at different places, and the value of the accelerating force of gravity according to Sir George Airy:

OBSERVER.	Place.	Latitude.	Length of pendulum vibrating seconds, in inches.	Velocity in feet acquired in one second by a body falling from rest.
Sabine	Spitzbergen	N. 79° 50'	39.21469	32.2528
Sabine	Hammerfest	70 40	39.19475	32.2368
Stranberg	Stockholm	59 21	39.16541	32.2122
Bessel	Königsberg	54 42	39.15072	32.2002
Sabine	Greenwich	51 29	39.13983	32.1912
Borda, Biot, and Sabine	Paris	48 50	39.12851	32.1819
Biot	Bordeaux	44 50	39.11296	32.1691
Sabine	New York	40 45	39.10120	32.1594
Freyrcnet	Sandwich Islands	20 52	39.04690	32.1148
Sabine	Trinidad	10 39	39.01883	32.0918
Freyrcnet	Rawa	S. 0 2	39.01433	32.0880
Sabine and Duperrey	Ascension	7 55	39.02863	32.0956
Freyrcnet and Duperrey	Mauritius	20 10	39.04684	32.1151
Brisbane and Rumker	Paramatta	33 49	39.07452	32.1375
Freyrcnet and Duperrey	Falkland Islands	51 35	39.13781	32.1895

From these values the following very simple and convenient formula has been deduced: If L denote the length of a seconds pendulum at any latitude λ , and 39.017 inches be the length of a seconds pendulum at the equator, then $L = 39.017 + 0.200 \sin^2 \lambda$.

GRAVITY, Specific, the ratio of the weight of one body to that of an equal volume of another, adopted as a standard of reference. For solids and liquids the standard is pure water, at a temperature of 60° F., the barometer being at 30 inches. Air is the standard for aeriform bodies. A cubic foot of water weighing 1,000 oz., if the same bulk of another substance, as for instance cast iron, is found to weigh 7,200 oz., its proportional weight or specific gravity is 7.2. It is convenient to know the figures representing this proportion for every substance in common use, that the weight of any given bulk may be readily determined; and for all substances the specific gravity is used among other tests for the purpose of distinguishing bodies from each other, the same substance being found, under the same circumstances, to retain its peculiar proportional weight or density. Hence tables of specific gravity are prepared for reference, and in every scientific description of substances the specific gravity is mentioned. In practical use, the weight of a cubic foot is obtained from the figures representing the density by moving the decimal point three figures to the right, which obviously from the example above gives the ounces, and these divided by 16 the pounds avoirdupois, in the cubic foot. Different methods may be employed to ascertain the specific gravity of solids. That by measuring the bulk and weighing is rarely practicable, nor is it desirable. As a body immersed in water must displace its own bulk of the fluid, the specific gravity may be ascertained by introducing a body, after weighing it, into a suitable vessel exactly filled with water, and then weighing the fluid which is expelled. The proportional weight is then at once obtained. Wax will cause its own weight of water to overflow; its specific gravity is then 1. Platinum, according to the condition it is in, will cause only from $\frac{1}{11}$ to $\frac{1}{21.5}$ of its weight of water to escape,

showing its specific gravity to be from 21 to 21.5. But a more exact method than this is commonly employed. The difference of weight of the same substance, weighed in air and when immersed in water, is exactly that of the water it displaces, and may consequently be taken as the weight of its own bulk of water. The specific gravity then is obtained by weighing the body first in air, and then, suspended by a fibre of silk or a hair, in water, and dividing the weight in air by the difference. If the body is lighter than water, it is to be attached to one heavier, to make it sink; then find the loss of the two by immersion, and also the loss of the heavier body; the difference will express the weight of water displaced by the lighter body, whose weight divided by this difference will give its specific gravity. It is hardly necessary to say that the substance examined must be free from mixture of foreign matters, and especially from cavities that may contain air. Minerals, if suspected to contain such, should be coarsely pulverized, and then the second method above may be conveniently applied to determine their density. The specific gravity of fine powders may be determined by one of the methods employed for ascertaining the specific gravity of fluids, viz.: by comparing the weight of a measured quantity with that of the same quantity of water. A glass vessel called a specific gravity bottle is commonly employed, which is furnished with a slender neck, upon which is a mark indicating the height reached by 1,000 grains of water. The substance to be examined is introduced till it reaches the same mark, and, the weight of the empty bottle being known, only one weighing is required to obtain the result.—A common method for finding the specific gravity of fluids is by the instrument called a hydrometer or areometer, of which several kinds are in use, all dependent on the principle that the weights required to immerse a light body, as a bulb of glass, in different fluids, are proportional to the densities of these fluids. Such instruments are used for ascertaining the specific gravity of liquors, as an indication of their strength. (See **HYDROMETER**.) Gaseous bodies are weighed in a thin glass flask or other vessel made for the purpose, and

provided with a stopcock. The vessel is exhausted of air before the introduction of the gas. The experiment requires particular care, as the result will be found to vary under different conditions of pressure, temperature, and the hygrometric state of the atmosphere. The temperature of the air should be 60° and barometric pressure 30 inches. The specific gravities may also be calculated from the atomic weights of the gases: when the atomic volume is equal to that of hydrogen, it is obtained by multiplying the specific gravity of hydrogen by the atomic weight of the gas; when the atomic volume is half that of hydrogen, the specific gravity of the gas is equal to the specific gravity of hydrogen multiplied by twice the atomic weight of the gas; and when the atomic volume is twice that of hydrogen, the specific gravity of the gas is equal to the specific gravity of hydrogen multiplied by half the atomic weight of the gas.—The proportions of two ingredients in a compound, as in an alloy of gold and silver, may be found by multiplying the specific gravity of each ingredient by the difference between it and the specific gravity of the compound. As the sum of the products is to the respective products, so is the specific gravity of the body to the proportions of the ingredients; then as the specific gravity of the compound is to the weight of the compound, so are each of the proportions to the weight of its material.—The following table presents the specific gravities of substances most likely to be referred to, collected from various sources. The weight of a cubic foot in ounces avoirdupois is seen by moving the decimal point three figures to the right.

TABLE OF SPECIFIC GRAVITIES.

Acid, acetic.....	1.062	Cadmium.....	8.600
arsenic.....	8.991	Caoutchouc.....	0.938
boracic, crystallized.....	1.479	Chalk.....	2.784
boracic, fused.....	1.803	Cinnabar.....	8.998
citric.....	1.084	Clay.....	1.930
hydrochloric.....	1.299	Coal, bituminous.....	1.020 to 1.350
nitric.....	1.271 to 1.583	Cobalt, cast.....	7.812
aqua regia.....	1.294	Copal.....	1.045
phosphoric, liquid.....	1.558	Copper, native.....	8.940
phosphoric, solid.....	2.800	cast.....	8.788
sulphuric.....	1.841	wire.....	8.878
Alabaster.....	1.874	coin.....	8.915
Alcohol, absolute.....	1.792	Coral.....	2.540 to 2.850
of commerce.....	0.835	Diamond.....	3.521 to 3.550
Ale or beer.....	1.085	Dolomite.....	2.540 to 2.830
Alum.....	1.724	Earth, mean of the.....	
Aluminum.....	2.560 to 2.670	globe.....	5.210
Amber.....	1.064 to 1.100	Emerald.....	2.678 to 2.775
Ambergris.....	0.970 to 0.926	Ether, sulphuric.....	0.632 to 0.775
Amethyst, common.....	2.750	Fat of beef.....	0.928
oriental, or violet.....		Freestone.....	2.400 to 2.620
sapphire.....	3.809 to 4.160	Freestone.....	2.143
Ammonia.....	0.875	Garnet.....	3.150 to 4.300
Anthraxite.....	1.860 to 1.850	Glass, bottle.....	2.733
Antimony.....	6.702	crowns.....	2.520
Asphaltum.....	0.905 to 1.650	green.....	2.642
Barytes.....	4.000	flint.....	2.760 to 3.829
sulphate of (heavy.....		plate.....	2.760
spar).....	4.800 to 4.720	plate of St. Gobain.....	2.488
Basil.....	2.864	Gold, native.....	19.500 to 19.500
Beeswax.....	0.956 to 0.964	pure, cast.....	19.258
Bismuth.....	9.822	hammered.....	19.362
Brandy.....	0.887	coin.....	17.647
Brass.....	7.824 to 8.396	22 carats fine.....	17.456
wire.....	8.044	20 carats fine.....	17.509
Brick.....	1.900 to 2.000	Granite, Quincy.....	2.652
Bronze, gun metal.....	8.700	Statens Island.....	2.780
Butter.....	0.942	Graphite.....	1.957 to 2.400

Grindstone.....	2.143	Peruvian bark.....	0.784
Gunpowder, loose.....	0.886	Pewter.....	7.471
close shaken.....	0.987 to 1.000	Phosphorus.....	1.770
sold.....	1.550 to 1.600	Platinum, native.....	17.000
Gum arabic.....	1.452	refined.....	19.600
Gypsum, compact.....	1.572	hammered.....	20.836
Hellotrope or blood-stone.....	2.258	wire.....	21.041
Hematite iron ore.....	2.630 to 2.700	laminated.....	22.069
cast.....	4.500	Porcelain, China.....	2.385
ore, magnetic.....	5.800	Sèvres.....	2.145
Honey.....	1.456	Porphyry.....	2.458 to 2.972
Hyacinth.....	4.000 to 4.750	Potassium.....	0.865
Ice.....	0.930	Proof spirit.....	0.923
Iodine.....	4.948	Quartz.....	2.500 to 2.800
Iridium, hammered.....	28.000	Rhodium.....	11.000
Iron, malleable.....	7.645 to 7.817	Rosin.....	1.100
cast.....	7.207	Ruby.....	4.283
ore, magnetic.....	4.900 to 5.200	Salt, common.....	2.130
Ivory.....	1.822 to 1.917	Sand.....	1.500 to 1.800
Lard.....	0.947	Sapphirine, oriental.....	3.094
Lead, cast.....	11.850 to 11.445	Serpentine.....	2.507 to 2.661
white.....	7.235	Silver, pure, cast.....	10.474
ore, galena.....	7.250 to 7.780	hammered.....	10.510
Lime, quick.....	0.804	coin.....	10.534
Limestone, com.....	2.886	Slate.....	2.110 to 2.673
pack.....	3.000	Sopstone.....	2.650 to 2.806
crystallized.....	2.722	Sodium.....	0.973
Magnesia, carb.....	2.222 to 2.612	Spermaceti.....	0.943
Malachite.....	3.700 to 4.000	Steel, hard.....	7.816 to 7.840
Manganese ore (psilomelane).....	3.700 to 4.830	soft.....	7.833
Marble, Carrara.....	2.716	Sugar.....	1.006
Parian.....	2.827	Sulphur, native.....	2.083
Egyptian.....	2.668	fused.....	1.990
Mercury, common.....	13.588	Tallow.....	0.941
pure.....	14.000	Tar.....	1.015
Mica.....	2.750 to 3.100	Tellurium.....	5.700 to 6.115
Milk.....	1.032	Tin, cast.....	7.291
Myrrh.....	1.360	hardened.....	7.200
Naphtha.....	0.700 to 0.847	Topaz.....	3.400 to 3.650
Nickel, cast.....	8.279	Tourmaline.....	2.940 to 3.300
Nitre (saltpetre).....	1.900	Tungsten.....	17.400
Oil, castor.....	0.970	Turquoise.....	2.600 to 2.830
linseed.....	0.940	Ultramarine.....	2.362
olive.....	0.915	Vinegar.....	1.018 to 1.050
turpentine.....	0.870	Water, distilled.....	1.000
whale.....	0.928	sea.....	1.023
Opal.....	2.114	Dead sea.....	1.240
Opium.....	1.337	Wine, Burgundy.....	0.981
Palladium.....	1.900	white champagne.....	0.997
Pearl, oriental.....	2.510 to 2.750	Wood (see tables in article FUEL).....	
		Zinc, cast.....	7.100

GRAY, a town of France, in the department of Haute-Saône, on the left bank of the river Saône, 30 m. S. W. of Vesoul; pop. in 1866, 6,764. It is on a hill, in the form of an amphitheatre, and the streets are narrow, but the town is pretty well built. The river is spanned by a suspension bridge and one of stone. There are a college, a public library, and a theatre. The chief manufactures are hair cloth, woollen goods, leather, and starch. In the environs are several iron works. Gray is a very ancient town, and was the last place in Franche-Comté which submitted to Louis XIV. in 1668.

GRAY, Asa, an American botanist, born in Paris, Oneida co., N. Y., Nov. 18, 1810. He graduated at the Fairfield medical college in 1831, but abandoned the practice of medicine, and applied himself to the study of botany. In 1834 he was appointed botanist to the United States exploring expedition; but as some time elapsed before it was ready to sail, he resigned that situation. In 1842 he was elected Fisher professor of natural history in Harvard college. In his numerous writings he has shown equal ability in communicating elementary knowledge and in elucidating recondite theory. His elementary works, "Elements of Botany," pub-

lished in 1836, and especially his later series, "How Plants Grow," "How Plants Behave," "Lessons in Botany," and "Structural and Systematic Botany" (1858), are unsurpassed in the language for precision, simplicity, perspicuity, and comprehensiveness. His labors are recorded in numerous papers contributed to the principal scientific journals and academical memoirs of the day, and in several special works. He came forward at a time when the old artificial systems of botany were giving way before the natural system. Dr. Gray, with Dr. John Torrey, was among the first who arranged the heterogeneous assemblage of species upon the natural basis of affinity. While actively engaged in describing the new forms which were pouring in upon them from numerous explorations in our hitherto almost unknown territory, they were elaborating the accumulated knowledge of their predecessors which remained in a crude form. In 1838 Dr. Gray commenced, in conjunction with Dr. Torrey, the publication of a "Flora of North America," intended to give a thorough and comprehensive history of the botany of the country upon the basis of the then little known natural system. This was continued as far as the end of the order *compositae*; but as the explorations of several collectors were accumulating masses of new material from our western borders, the "Flora" was suspended until this wealth of matter could be aggregated under one head. The government expeditions to the Pacific coast also returned laden with botanical treasures, which were described by Dr. Gray and Dr. Torrey in the government reports. In 1848 Dr. Gray began his "Genera of the Plants of the United States, illustrated by Isaac Sprague," and in the same year the "Manual of the Botany of the Northern United States," several editions of which, enlarged and amended, have since appeared. In 1854 appeared the first volume of the "Botany of the United States Pacific Exploring Expedition under Capt. Wilkes," a work in which the author has shown himself able to treat of the botany of remote regions with the same critical power that he has applied to the North American flora. In 1861 he published "A Free Examination of Darwin's Treatise on the Origin of Species, and of its American Reviewers." He is an associate editor of the "American Journal of Science and Arts." In 1873 he retired from active service in teaching, to devote himself to the charge of the herbarium of Harvard college, and to scientific work. In 1874 he was appointed a regent of the Smithsonian institution in place of Prof. Agassiz.

GRAY, David, a Scottish poet, born at Duntiblae, near Glasgow, Jan. 29, 1838, died at Merkland, Dec. 3, 1861. His father was a handloom weaver with a large family. David, the eldest, was intended for the ministry. When he was still very young the family removed to Merkland, on the other side of the Luggie, with which stream much of his poetry is as-

sociated. He finished his education with a partial course at Glasgow university, becoming proficient in Greek, Latin, and French. After spending some time there as a private tutor, he wrote to Mr. Milnes (now Lord Houghton), enclosing manuscript poems and asking for advice. Milnes recognized his genius, but discouraged his plan of going to London as a literary adventurer. Nevertheless he went, arriving there early in May, 1860, with but a sovereign in his pocket. He spent the first night in Hyde Park, contracting the pulmonary disease of which he died. Meanwhile he had sent his poem "The Luggie" in manuscript to several literary men of celebrity, but none of them found time to read it. He called on Milnes, who befriended him and sent the poem to Thackeray, recommending it for the "Cornhill Magazine;" but Thackeray rejected it. It soon became evident that Gray was seriously ill, and Milnes sent him home to Scotland. At last, through the agency of Sydney Dobell, a publisher was found for his poems, and a specimen page of proof reached the author the day before he died. "The Luggie and other Poems" appeared in London in 1862, and in Boston in 1864 (enlarged ed., 1874).

GRAY, Henry Peters, an American painter, born in New York, June 23, 1819. He entered the studio of Daniel Huntington in 1838, and in 1839 went to Europe, where he painted his pictures of "Thou art Gone," the "Roman Girl," the "Billet Doux," &c. Returning to New York in 1843, he executed a number of small pictures of genre and history; and after another absence abroad in 1845-'6, during which he produced his "Teaching a Child to Pray," "Proserpine and Bacchus," Cupid begging his Arrows," &c., he settled in New York. Among the most important of his works are the "Wages of War," the "Apple of Discord," "Hagar and the Angel," "Portia and Bassanio," "Charity," "Genevieve," "Cleopatra," "St. Christopher," "I Fiore di Fiesole," and the "Origin of the American Flag." He has also painted several hundred portraits. From 1869 to 1871 he was president of the national academy of design. In 1871 he went to Europe, and still continues to reside there (1874).

GRAY, I. John Edward, an English naturalist, born at Walsall in 1800. For nearly 50 years he has been connected with the British museum, over the natural history department of which he now presides (1874). In addition to his labors in arranging the collections of the museum, he has been a voluminous contributor to natural history, particularly in the department of zoölogy; and profiting by the advantages which his position has afforded him, he has probably described and classified a larger number of animal forms than any other naturalist. The most valuable of his numerous works are the catalogues of the museum, including those on mollusca, mammalia, and reptiles, in which, besides the lists of animals, he gives much information on the habits, character, and

uses of the different species. His writings are comprised under the following heads: the general subject of natural history, the mammalia, birds, reptiles, fishes, articulate animals, the mollusca, and the radiata. His papers on the mammalia and the mollusca in 1852 amounted to considerably over 100 in each department, those on the latter subject being particularly valuable on account of their extensive and exact information. The most important of them is the "Systematic Arrangement of Molluscos Animals, with Characters of Families." In his conchological studies he has received much assistance from his wife, an accomplished naturalist, and the author of "Figures of Molluscos Animals for the Use of Students," descriptions of which have been given by Mr. Gray. A larger share of his attention has however been devoted to herpetology than to any other branch of natural science, and more than 70 papers describing the structure and habits of species from many parts of the world are included among his writings. Dr. Gray has been prominent in the work of reforming prison discipline and in sanitary measures, founded the Greenwich society of useful knowledge, and claims to have originated the plan of cheap postage prepaid by stamps. **II. George Robert**, an English naturalist, brother of the preceding, born at Little Chelsea, July 8, 1808. He early began the study of zoology at the British museum, was employed in the zoological department from 1831, and in 1869 became assistant keeper of the zoological collections. He is the author of several works and papers on entomology and ornithology, and in 1832 contributed the entomological portion to the English edition of Cuvier's "Animal Kingdom." He published a "List of the Genera of Birds," reedited in 1841 and in 1855. His large work, "Genera of Birds" (3 vols., 1837-'49), is universally valued by naturalists. In 1870 he published his "Hand List of the Genera and Species of Birds," embracing 2,915 genera and subgenera, and 11,162 species.

GRAY, Thomas, an English poet, born in Cornhill, London, Dec. 26, 1716, died July 30, 1771. He was educated at Eton and Cambridge, where his expenses were borne by his mother, his father refusing to maintain him. At Eton Gray formed an intimacy with Richard West, a son of the lord chancellor of Ireland, and also with Horace Walpole, with whom in 1739-'41 he travelled in France and Italy. He spent 11 months at Florence, and there began his Latin poem *De Principiis Cogitandi*. He returned in 1741, and became bachelor of the civil law at Cambridge, though he never offered to practise, but continued to live at his university. He corresponded frequently with West, and communicated to him a portion of a tragedy called "Agrippina," in which Nero and his mother and Seneca were to be prominent characters, but which West induced him to abandon. He was easily affected by discouraging criticism, and had nearly laid aside his

"Progress of Poesy" because Mason said he did not think it would take with the public. Having become estranged from Walpole, and West having died in 1742, Gray was much depressed. At this time he wrote his "Ode to Adversity" and the ode "On a Distant Prospect of Eton College." About the same time he was engaged on his Latin poem *De Principiis*, in which he designed to teach Locke's metaphysics in hexameters. From 1742 he remained at Cambridge, always dissatisfied with the place, and never professing contentment. In 1748 he began a poem, which he never completed, "On Government and Education." It has some fine lines, in spite of the unpoetical subject. Gray, although of refined tastes and manners, shrank from society, living chiefly among scholars. He encouraged Mason, then a young poet, revised his verses, and helped him to an election as fellow of Pembroke hall. Mason became his constant associate, and was afterward his biographer. In 1749 Gray finished the "Elegy written in a Country Churchyard," said to have been begun seven years before, in the churchyard of Stoke-Pogis, Buckinghamshire, in which town his mother was living. It originally appeared in 1752, and achieved an immediate popularity, four editions being called for within a year. Several of his pieces were printed in 1753 with designs by Mr. Bentley, and, being too few to make a book of the usual size, were printed only on one side of the leaf. The poems and the plates together sold well. In 1756 he removed to Pembroke hall. His odes, "The Progress of Poesy" and "The Bard," appeared in 1757, and were received with much ridicule. Few professed to understand them, but the public finally learned to admire. His poems were parodied in two odes which not long after appeared on "Obscurity" and "Oblivion." Between the years 1759 and 1762 he occupied lodgings in Southampton row, near the British museum, then just opened, and made extracts from the Harleian and other collections which filled a considerable folio volume. On the death of Oibber the laureateship was offered to him, which he declined. He was appointed in 1768 professor of modern history at Cambridge. His health now rapidly declined. In the autumn of 1770 he was able to travel in Wales; he saw Westmoreland and Cumberland, and wrote in correspondence a delightful narrative of his travels. He died of gout in the stomach, and was buried at Stoke-Pogis. Gray was small, delicate, of handsome features, and studiously refined. His manners were nice to effeminacy, his dress carefully adjusted to the fashions of the day. He speaks of himself as a person of great pride and reserve; but he was capable of strong and tender emotion. He could often be satirical, and among his intimate friends his conversation was singularly entertaining and instructive, but he spoke little in company. To his great attainments all his friends bear testimony, but he left no public

proof of them. He was a botanist, a zoölogist, an architect, and an antiquary. He had read all the Greek classics, and planned an edition of Strabo. He was familiar with history, was learned in art, had studied the schools of philosophy, and wrote better Latin verse than any of his contemporaries. His "Elegy" is the culmination of his genius, almost every line having fixed itself upon the popular mind. Among the best of the numerous editions of Gray's poems are those by W. Mason, with his letters and a memoir (4 vols. 8vo, York, 1778); and by the Rev. John Mitford, with notes and a memoir (London, 1814), several times republished. An edition of his complete works, with Mason's memoir, was issued by T. J. Mathias (2 vols. 4to, London, 1814). Mr. Mitford also published in 1853 Gray's correspondence with Mason, showing that the poet's letters were mutilated by Mason in his edition.

GRAYDON, Alexander, an American author, born in Bristol, Pa., April 10, 1752, died in Philadelphia, May 2, 1818. He was educated in Philadelphia, and in 1775 joined the colonial forces as captain. After carrying a supply of money to the troops under the command of Gen. Schuyler at Lake George, he joined the army at New York, and was taken prisoner in the action on Harlem heights. He was confined in New York and at Flatbush, was afterward liberated on parole, and exchanged in 1778. He resided in Harrisburg from 1785 to 1799, when he removed to a farm near that city, from which he returned to Philadelphia in 1816. He published in 1811 his "Memoirs of a Life, chiefly passed in Pennsylvania, within the last Sixty Years," illustrative of revolutionary manners and history. It was republished in Edinburgh (1822) and in Philadelphia (1846).

GRAYLING, a soft-rayed fish, of the salmon family, and genus *thymallus* (Cuv.), found in the rivers of northern Europe, Asia, and America. The English grayling has the head and body elongated, the former pointed and flattened on the top; two dorsals, the first much longer than it is high and with numerous rays, the second small, adipose, and rayless; the mouth small; the teeth numerous, conical, small, in a single series on the jaws and anterior part of the vomer, none on the tongue; the scales rather large, and the lateral line not very conspicuous; the air bladder is capacious, and communicates with the gullet by a very small tube; the caudal is forked; branchiostegal rays seven or eight. It is very handsome and lively, though less active than the trout; the general color is light yellowish brown, with reflections of golden, copper, green, and blue, and some dark spots; the head brown, and the fins darker than the body; the dorsal fin is varied with square dusky spots; the colors grow darker by age, and in dark waters; the iris is golden yellow, and the pupil blue. This is probably the *T. vulgaris* (Nilss.), found in a few of the rivers of England, in restricted localities, in Sweden, Norway, and Lapland,

but probably not in Ireland or Scotland. It prefers rivers with rocky and gravelly bottom, with alternate stream and pool; it swims deeper than the trout, and feeds on flies and aquatic larvæ, especially on those which construct cases (like the May flies), and on small shells and crustaceans. It is excellent for the table, is in the finest condition in October and November, and should be dressed soon after being taken; it rises to the fly, but less readily than the trout. From the size of its dorsal it cannot stem rapid currents nor leap falls. The generic name was given from an alleged resemblance of the odor of its flesh to that of thyme; from its color and odor St. Ambrose is said to have called it the "flower of fishes." Unlike other *salmonida*, it spawns in April or May; the average length is 10 or 12 in., with a weight of about 1½ lb., but they have been taken weighing 4½ lbs. For a full and interesting account of the habits and history of this fish, the reader is referred to the seventh "Conversation" in "Salmonia," by Sir Humphry Davy. Other species are the *T. vexillifer* (Ag.), from the rivers of France and the Swiss lakes and streams; and the naked-throated grayling (*T. gymnothorax*, Val.), in



Back's Grayling (*Thymallus signifer*).

which the parts beneath the throat are destitute of scales, found in Prussia and Russia. The grayling is called *ombre* in French and *Aesche* in German, probably from its prevailing ashy gray color in the water. In America, this fish has been found in the cold clear waters of Great Bear and Winter lakes, and in streams emptying into Mackenzie river. Back's grayling (*T. signifer*, Rich.) has not been discovered south of lat. 62° N.; this is a large species, about 17 in. long, and highly esteemed by the Esquimaux and the *voyageurs*.

GRAYSON. I. A S. W. county of Virginia, bounded S. by North Carolina and N. W. by the Iron mountain; area, 400 sq. m.; pop. in 1870, 9,587, of whom 754 were colored. It is intersected by Kanawha or New river. The county is well adapted for grazing. Iron ore is abundant. The chief productions in 1870 were 30,060 bushels of wheat, 42,704 of rye, 109,938 of Indian corn, 63,695 of oats, 12,313 of potatoes, 91,543 lbs. of butter, 25,326 of wool, and 4,016 tons of hay. There were 2,056 horses, 2,947 milch cows, 4,057 other cattle, 11,811 sheep, 7,778 swine, and 4 flour mills. Capital, Independence. II. A N. county of Texas, separated by Red river from the In-

dian territory; area, 950 sq. m.; pop. in 1870, 14,387, of whom 2,145 were colored. The surface is undulating and partly covered with forests of oak, ash, and elm. The soil is a dark fertile loam, suitable for various kinds of fruit, grain, cotton, and pasturage. The chief productions in 1870 were 39,768 bushels of wheat, 577,540 of Indian corn, 113,241 of oats, 39,411 of sweet potatoes, 111,840 lbs. of butter, and 2,885 bales of cotton. There were 7,324 horses, 4,840 milch cows, 26,167 other cattle, 5,911 sheep, 18,535 swine, 4 saw mills, and 4 wool-carding establishments. Capital, Sherman. **III.** A central county of Kentucky, bounded N. by Rough creek and drained by several affluents of Green river; area, about 700 sq. m.; pop. in 1870, 11,580, of whom 407 were colored. It is traversed by the Elizabethtown and Paducah railroad. The surface is level or undulating and the soil moderately fertile. Anthracite and carboniferous limestone are found in abundance, and there are several white sulphur springs. The chief productions in 1870 were 25,448 bushels of wheat, 377,005 of Indian corn, 80,953 of oats, 20,722 of potatoes, 149,001 lbs. of butter, 859,760 of tobacco, and 1,398 tons of hay. There were 3,172 horses, 2,816 milch cows, 4,158 other cattle, 14,543 sheep, and 17,934 swine; 3 flour and 4 saw mills, and 3 wool-carding and cloth-dressing establishments. Capital, Litchfield.

GRAZIANI, Francesco, an Italian vocalist, born at Fermo, April 26, 1829. He became famous in Paris in 1851 as Aston in *Lucia di Lammermoor*, and sustained his reputation as one of the best baritones of the day by his subsequent performances in Florence, New York, London, and St. Petersburg.—His brother **LUDOVICO**, born in August, 1823, excels as a tenor; the part of German in *La traviata* was written for him.

GREAT BARRINGTON, a town of Berkshire co., Massachusetts, on the Housatonic river and railroad, 40 m. W. of Springfield; pop. in 1870, 4,320. It is pleasantly situated, watered by a number of good mill streams, and surrounded by beautiful hills. It contains beds of iron ore and quarries of fine variegated marble. The manufactures embrace cotton goods, paper, woollens, pig iron, bricks, and saw-mill products. It has a national bank, a savings bank, a weekly newspaper, 18 public schools, including a high school, and 7 churches. It comprises three villages, viz.: Great Barrington, Housatonic, and Van Deusenville. Great Barrington was the county seat till 1787.

GREAT BASIN, or **Fremont's Basin**, the region lying between the Wahsatch mountains on the east and the Sierra Nevada on the west, embracing Nevada, the W. portion of Utah, and the S. E. part of California. In shape it resembles an ancient shield, the broad end toward the north, and the S. extremity rounded to a point. Its waters have no outlet to the ocean, and it evidently formed at a remote period an inland sea. The greatest depressions are near the borders, especially along the E. and W.

sides, while the central portion reaches a much greater elevation, and is broken into a series of detached ridges. Along the line of the Central Pacific railroad the elevations are as follows: at Brigham, on the border of Great Salt lake, 4,220 ft. above the level of the sea; at Pequop, a short distance W. of the Nevada boundary, 6,184 ft.; and at Desert, in the W. part of Nevada, 4,017 ft. The height at the points of greatest depression in the S. E. and S. W. parts has not been accurately determined, but in the neighborhood of Sevier lake it is not more than 4,500 ft. above the sea. The highest ranges in the basin probably attain an elevation of from 7,500 to 8,000 ft. The Wahsatch range, which, running almost directly N. and S. near the 112th meridian, forms the E. rim, rises abruptly from the narrow plains, seldom sending out foot hills or slopes. The mountain ridges in the interior, separated by valleys of various width, run parallel to each other in a N. and S. direction, determining the course of the minor streams, though the few principal rivers break through them. The elevation which forms the N. rim, separating the basin from the valley of the Columbia, also consists of parallel ridges running N. and S. The principal body of water is Great Salt lake in the N. E. part, the region draining into it being known as the Great Salt Lake basin. Other lakes are Utah and Sevier, in Utah; Walker's lake, Carson lake, Pyramid lake, and Mud lake, in Nevada; and Mono and Owen's lakes, in California. Bear river empties into Great Salt lake; the Provo or Timpanogas into Utah lake; while the Jordan discharges the waters of Utah lake into Great Salt lake. Sevier, Walker's, Carson, and Owen's lakes receive rivers of the same names; the Truckee empties into Pyramid lake. Humboldt river rises in the N. E. part of Nevada, and after a course a little S. of W. of about 300 m. disappears in the "Humboldt sink." Reese river flows N. toward the Humboldt, but generally sinks before reaching it. The greater portion of the basin is an arid and sterile waste, covered with alkaline deposits, and producing only a growth of sage brush. Considerable tracts, however, may be rendered productive by irrigation, and larger portions are adapted to grazing. Except upon the mountains in the N. part forests scarcely exist. The climate is dry, rain rarely falling from April to October. The basin is rich in the precious metals, particularly silver.

GREAT BEAR LAKE. See **BEAR LAKE**.

GREAT BRITAIN, in a geographical sense, the largest and most important island of Europe, and in a political sense, as popularly used, the British empire, or the United Kingdom of Great Britain and Ireland. Britain (Britannia) was the ancient name of the island, by which it was known to the Romans. The western peninsular projection of France, called by the Romans Armorica, was occupied by the same race that constituted the aboriginal population of Britain. As early as the 6th century of our

era, the French applied the term Bretagne (Britain) to Armorica, and to distinguish the continental from the insular Britain, called the former "Little Britain" and the latter "Great Britain." The term Great Britain was little used by the islanders themselves until the accession of James I. to the crown of England in 1603 united the whole of the island under one sovereign. By the legislative union between England and Scotland in 1707 Great Britain became the legal name of the kingdom. The island comprises England, Wales, and Scotland. Scotland is frequently termed North Britain. The official style of the empire is "The United Kingdom of Great Britain and Ireland," but in current language the term Great Britain includes politically the British and Irish kingdoms, and is the common designation of the whole imperial power. (See BRITISH EMPIRE, ENGLAND, SCOTLAND, AND WALES.)

GREAT FALLS. See SOMERSWORTH.

GREAT GRIMSBY, a parliamentary and municipal borough and seaport of Lincolnshire, England, on the right bank of the Humber, 30 m. N. E. of Lincoln; pop. in 1871, 20,288. The town consists of two portions: the older is at the head of the harbor, and the newer, called the Marsh, extends along the east side of the harbor. It has free grammar schools, a national school, a mechanics' institute, and a new town hall. There is a large trade in fish, timber, coal, and salt.

GREAT KANAWHA RIVER, a large stream of North Carolina and the Virginias, called in the upper part of its course New river. It rises in the N. W. part of the former state, between the Blue Ridge and Iron mountain, and flows N. E. to the N. part of Grayson co., Va., where it passes through a defile in the Iron mountain, and, bending toward the N. W., breaks through Walker's, Peter's, and Greenbrier ridges of the Alleghanies. After receiving Gauley river in Fayette co., W. Va., it takes the name of Great Kanawha, passes through the coal and salt region, and joins the Ohio at Point Pleasant, Mason co., W. Va. Its length is about 400 m.; its width 66 m. above its mouth is 450 ft., and at the junction of Gauley river, 100 m. above its mouth, 1,500 ft. It is navigable at all seasons to a point about 2 m. below the Gauley, where the river has a picturesque perpendicular fall of 50 ft. Its principal affluents are the Greenbrier, Gauley, and Elk on the north, and Coal river on the south. The principal towns on its banks are Pearisburg, Va., and Fayetteville, Charleston, and Point Pleasant, W. Va.

GREAT MARLOW, a town of Buckinghamshire, England, on the Thames, 11 m. N. E. of Reading; pop. in 1871, 6,619. It has a fine church, manufactories of paper and lace, and a considerable trade in lumber, coal, and corn.

GREATOREX, Eliza, an American artist, born at Manor Hamilton, Connaught, Ireland, Dec. 25, 1820. She is the daughter of the Rev. J. O. Pratt, a Wesleyan minister. When 19 years

old she came to the United States, and married Henry W. Greatorex, the son of the organist of Westminster abbey. From 1854 to 1856 she studied landscape painting with W. W. Witherspoon of New York, and then visited England and Ireland, making drawings of lake scenery. In 1862 she studied under Edouard Lambinet in Paris, and afterward sketched along the Rhine. She went again to Europe in 1866, and made pen-and-ink drawings in England, Holland, Germany, Italy, and Paris. In 1868-'9 she made pen-and-ink drawings of the old buildings in and around New York. In 1870 she returned to Europe and studied landscape and architectural drawing in Munich, where she published in 1872 "The Homes of Oberammergau" (New York, 1873), a series of 20 etchings from pen-and-ink sketches, with notes from her diary. In 1873 she published "Summer Etchings in Colorado," with 21 illustrations, and an album of "Etchings in Nuremberg." Her best known oil paintings are a "View on the Housatonic" (1863), "The Forge" (1864), and "Somerindyke House" (1869).

GREATRAKES, Valentine, an Irish quack, born at Affane, county Waterford, Feb. 14, 1628, died in Dublin, probably about 1700. He was educated at Trinity college, Dublin, and on the outbreak of the rebellion went to England, where he devoted some time to the study of the classics and divinity. He served in the parliamentary army from 1649 to 1656, when he returned to Ireland and was made a justice of the peace in county Cork, and held other offices which were taken from him at the restoration. Soon afterward he claimed the power to cure the king's evil and all other diseases by the touch; and in 1665 he went to London, where the king invited him to Whitehall, and where he is alleged to have performed many cures, which were attested by Robert Boyle, Sir John Godolphin, and many other eminent persons. Dr. Henry Stubbe published a pamphlet in praise of Greatrakes's skill, under the title "The Miraculist Conformist" (Oxford, 1666). Greatrakes having failed in one instance to effect a cure, David Lloyd published a pamphlet entitled "Wonders no Miracles" (London, 1666), in which he denounced him as a cheat. To this Greatrakes replied in a letter addressed to Boyle, entitled "Account of Val. Greatrakes and divers of his strange Cures." In 1667 he returned to Ireland.

GREAT SALT LAKE, an extensive sheet of water in Utah, lying in the Great Basin, between lat. 40° 40' and 41° 45' N., and lon. 111° 50' and 113° 10' W. Its outline is somewhat irregular. There are several islands, of which the principal are Church or Antelope island in the southeast, and Stansbury island in the southwest. The lake is 75 m. long from N. W. to S. E. and about 30 m. broad. Its surface is 4,200 ft. above the level of the sea. It has no outlet. The water is shallow, the depth in many extensive parts being not more than 2 or 3 ft. Utah lake, a body of fresh water

35 m. long and 100 ft. above the level of Great Salt lake is 26 m. S. E. of the latter, and flows into it through a river called the Jordan. Utah lake abounds with fish. Bear river flows into the Great Salt lake from the north, and several smaller rivers from the east. The floods of spring spread the lake over large tracts, from which it recedes as summer advances. It was evidently once vastly more extensive than at present. The country around it is mostly desolate and barren, though there are portions which irrigation would render very fertile. The water is transparent, but excessively salt; it contains about 22 per cent. of chloride of sodium (common salt), slightly mixed with other salts, forming one of the purest and most concentrated brines in the world. Its specific gravity is 1.17. There are no fish in the lake, but several species of insects and a species of crustacean (*artemia fertilis*) have been found (see "United States Geological Survey of the Territories" for 1872, pp. 744-5); and immense flocks of gulls, wild ducks, geese, and swans frequent its shores and islands. The water is so buoyant that a man may float in it at full length upon his back, having his head and neck, his legs to the knee, and both arms to the elbow, entirely out of water. If he assumes a sitting position, with the arms extended, his shoulders will rise above the water. Swimming, however, is difficult from the tendency of the lower extremities to rise above the surface; and the brine is so strong that it cannot be swallowed without danger of strangulation, while a particle of it in the eye causes intense pain. A bath in this water is refreshing and invigorating, though the body requires to be washed afterward in fresh water.—The first mention of the Great Salt lake was by Baron La Hontan in 1689, who gathered from the Indians west of the Mississippi some vague notions of its existence. It was explored and described in 1843 by Fremont, who was the first to navigate its waters. A thorough survey was made in 1849-'50 by Capt. Howard Stansbury of the United States army, whose report of "An Expedition to the Valley of the Great Salt Lake" was printed at Washington by order of congress in 1852. Another edition was published at Philadelphia in 1855.—"The City of the Great Salt Lake," commonly called Salt Lake City, is situated on the Jordan river, which connects Lake Utah with the Great Salt lake, about 7 m. S. of the latter. (See SALT LAKE CITY.)

GREAT SLAVE LAKE (Fr. *Lac de l'Esclave*), a large irregular sheet of water in a district of the same name in the northwest territories of Canada, between lat. 60° 40' and 63° N., and lon. 109° 30' and 117° 30' W.; length from E. to W., 300 m.; greatest breadth, 50 m. Its N. shores are steep and rough, and from them it receives the outlets of Aylmer and Artillery lakes. On the south it presents a less rugged bank, and is entered by a river of its own name, flowing N. for about 300 m. from the W. end

of Lake Athabasca. It contains a number of islands, some of which are well wooded. For half the year it is frozen over. Mackenzie river connects it with the Arctic ocean.

GREAVES, John, an English mathematician and antiquary, born in Hampshire in 1602, died in London, Oct. 8, 1652. He was educated at Oxford, and in 1630 was chosen geometrical lecturer in Gresham college, London. After visiting Holland, France, and Italy, he embarked in 1637 for Constantinople, whence he went to Egypt to examine the pyramids, of which no satisfactory account had then been given, and in 1640 returned to England, bringing with him several Arabic, Persian, and Greek manuscripts, and a large collection of gems, coins, &c. Soon after his return he was appointed Savilian professor of astronomy at Oxford. In 1648, having been ejected from Oxford for royalism, he settled in London. He published a "Discourse on the Roman Foot and Denarius" (1647), wrote a Persian grammar, and partly compiled a Persian lexicon. A collection of his minor papers was published in two volumes in 1737.

GREBE, a lobe-footed bird of the family *colymbidae*, and subfamily *podicipinae*, comprising the genera *podiceps* (Lath.) and *podilymbus* (Lesson). The genus *podiceps* has a long, straight, and slender bill, the culmen slightly curved at the tip, which is sharp and entire, the sides compressed, and the nostrils longitudinal and in a short groove; the wings short and pointed, the first and second quills the longest and slightly emarginated near the tips; tail short, a mere tuft of loose feathers; tarsi shorter than the middle toe, much compressed, covered with scales serrated posteriorly; toes long, lobed on the sides, and united by webs at the base; hind toe short and broadly lobed; nails short, broad, flat, and obtuse. More than 20 species are described, in all parts of the world; they are usually seen in small flocks on the shores of fresh-water lakes and rivers and near the seacoast, and rarely on land, as the posterior position of the legs renders it very difficult for them to walk; they are excellent swimmers and expert divers, flying under water to a considerable depth in pursuit of fish; they are generally short and rapid flyers, but during their migrations the flight is elevated and long sustained; when alarmed, they hide among the reeds, or sink under water, leaving only the bill out, till the danger is over. The food consists of fish and aquatic animals and plants; the nest is made of grasses, lined with down, attached to the reeds or floating; the eggs are three or four in number. The American species vary much in size; one of the largest is the crested grebe (*P. cristatus*, Lath.), 24 in. long, with an extent of wings of 33; the adult male has a blackish brown bill, about 2½ in. long; upper part of head and crest, nape and upper plumage, blackish brown; the ruff, which birds of this genus have in the breeding season, is reddish brown ending in

black; cheeks, throat, band before eye, humeral feathers, and secondaries white; fore part and sides of neck reddish brown; rest of under parts silvery white; primaries dark brown; iris bright carmine; in the females and young the crest is very slight, and the up-



Crested Grebe (*Podiceps cristatus*).

per parts are tinged with gray. It is found along the Atlantic coast from the fur countries, where it breeds, southward, and as far as Texas in the winter, and also on the Pacific shore. All the species have the head rather small, the eyes near the bill, the neck long and slender, and the body flattened; the plumage is thick and soft, and silky on the under surface. The red-necked grebe (*P. griseigena*, Gray), 18 in. long, is found from the fur countries as far south as Pennsylvania in the winter; it is a stouter bird, with shorter neck and smaller crest and ruff, than the preceding species. The largest known species is the western grebe (*P. occidentalis*, Lawrence), 29 in. long, with an extent of wings of 3 ft.; it inhabits the Pacific coast from Washington territory to California. The horned grebe (*P. cornutus*, Lath.) is about 14 in. long; the sides of the head are tufted, and of a yellowish red color; the feathers of the upper parts are margined with gray; throat glossy black; fore neck and upper breast chestnut red; lower parts shining white. It is very generally distributed over North America; it is known to gunners as the "hell diver," from its activity in diving; like that of all the grebes, the flesh has a strong fishy flavor, and is rarely eaten except by the northwest Indians, who also make under garments of the soft plumage of the lower parts.—In the genus *podilymbus* the bill is shorter than the head, strong, with the culmen much arched to the tip, which is hooked over the lower mandible; there are no ornamental ruffs. Only two species are described, one in North and the other in South America, generally distributed over the temperate regions, preferring

fresh water. The pied-bill grebe, or dobechick (*P. podiceps*, Lawr.; *P. carolinensis*, Lath.), is 14 in. long, with a pale blue bill crossed by a black band; the upper plumage very dark brown; chin and throat with a black patch; cheeks, sides of neck, and abdomen grayish white; upper breast and sides rusty brown; the female has not the black patches.

GREECE, a country of southeastern Europe, occupying the central and southern portions of the large and irregular peninsula which extends into the Mediterranean between the Ionian and the Aegean seas. By its own inhabitants, both in ancient and modern times, the country has been called Hellas; but the early population of Italy, gaining their first knowledge of the region from the Græci (*Ἕλληνες*), one of its northern tribes, formed from this tribal designation a name for the entire country (*Græcia*). From this have been derived the names given to it in most of the European languages (Fr. *la Grèce*, Ger. *Griechenland*, Ital. *Grecia*, &c.). In treating of the political and physical geography of Greece, we shall devote the first portion of this article to the description of the ancient country, reserving for a subsequent division an account of the modern kingdom.—Many difficulties attend the definition of the northern limits of ancient Greece, the amount of territory included in the possessions of the country varying greatly at different periods. Considering Greece proper as excluding Macedonia, Illyria, and Thrace, but including Thessaly and the greater part of Epirus, it began about lat. 40° N., where a natural boundary was formed by a chain of mountains extending from the Thermaic gulf on the east, and terminating in the Acroceræan promontory, on the Adriatic, on the west. From this boundary the peninsula of Greece extends southward to lat. 36° 23'. Its greatest length, exclusive of the Acroceræan projection, from Mt. Olympus in the northeast to Cape Ténarum at the southern extremity, is about 250 m.; its greatest width, from the W. coast of ancient Acarnania to Marathon, N. E. of Athens, is about 165 m. The area of the ancient country, excluding Epirus, but including the island of Eubœa, was about 21,000 sq. m. The mainland of Greece, deeply indented at several points by gulfs and almost landlocked bays, and crossed by mountain ranges, is naturally divided into three principal regions, northern and central Greece and the Peloponnesus. Northern Greece, extending from the N. boundary to the point where the peninsula is narrowed by the opposite Ambracian and Malia gulfs, included Epirus and Thessaly, regions nearly equal in size. Central Greece, that part extending from this point to the narrow isthmus of Corinth, comprised the divisions of Acarnania (at the western extremity), Ætolia (the next division toward the east), Ozolian Locris, Phocis, and Bœotia, these three bordering on the gulf of Corinth; Epicnemidian and Opuntian Locris and Doris to

the north of these; Attica, forming the eastern extremity of the whole peninsula; and Megaris, on the narrow land N. E. of the isthmus of Corinth, and between the Corinthian and Saronic gulfs. The Peloponnesus, including all of Greece S. and W. of the isthmus of Corinth, comprised Achaia and Sicyonia, on the Corinthian gulf; Corinthia, on the isthmus and the Corinthian and Saronic gulfs; Argolis, Laconia, Messenia, and Elis, all coast countries; and in the centre, completely surrounded by these, Arcadia. The exact boundaries of all the Greek states were frequently varied by war and political changes, but the divisions named above retained their identity throughout the period of the country's ancient history. The islands which lie in the Ionian and Ægean seas, and in the Mediterranean, within a short distance of the coasts of the peninsula, formed an important part of the ancient Greek possessions. Of these islands, the largest is Eubœa, about 100 m. long and 6 to 30 m. wide, lying E. of central Greece. S. E. of this lie the Cyclades, the large group which surrounded the famous holy island of Delos. E. of the Cyclades, and along the Asiatic coast, extend the Sporades. The islands of Crete and Rhodes lie further S. in the Mediterranean sea. Between Attica and Argolis, in the Saronic gulf, are Salamis and Ægina. Along the W. coast of Greece, in the Ionian sea, extend Corcyra, Paxos, Lencas, Cephallenia, Ithaca, and Zacynthus, which with Cythera, at the S. extremity of Laconia, are now known as the Ionian islands.—The surface of Greece is mountainous through almost its whole extent. The continuous range already mentioned as forming the N. boundary of the ancient country, including Mt. Olympus and the Cambunian and Ceraunian mountains, is crossed at its centre by the great chain of Pindus, which, running nearly N. and S. through the middle of northern Greece, formed a natural boundary between ancient Epirus and Thessaly. Near its S. end it divides into two branches, one stretching S. E. through central Greece, bearing the names of Ceta, Parnassus, Helicon, Cithæron, and Hymettus, and finally terminating at the extremity of Attica; the other extending S. W. under the names of Corax and the Ozolian mountains, and terminating near the W. end of the Corinthian gulf. The mountains of the Peloponnesus, also very numerous and closely connected, nevertheless belong to an entirely different system from that of the Pindus; instead of stretching in long ranges through the peninsula, they are clustered in knots and groups around a lofty central mass, which rises in northern Arcadia to the height of nearly 8,000 ft. The principal peaks of the whole country are as follows: in northern Greece, Mts. Olympus (9,754 ft.), Ossa (6,407), and Pelion (5,000); in central Greece, Mts. Parnassus (highest summit, 8,068), Ceta (7,071), Helicon (about 5,000), Cithæron (4,620), and Parnes (4,193); in the Peloponnesus, Cyllene (7,788), Erymanthus (7,297), Taygetus (highest

peak, 7,904), Artemisius (5,814), and Lycæus (4,659). The mountain system, the chief ranges of which have been thus described, had a very important effect upon the political as well as the physical divisions of ancient Greece. By dividing with natural walls the habitable and arable plains and less rugged portions of the country one from another, it prescribed the boundaries of states almost as definitely as could have been done by the most exact treaties.—The rivers of Greece are generally unimportant, save on account of their historic associations. Many of the streams are entirely dry during the summer months; none are navigable at any season. In northern Greece the principal rivers are the Achelous, rising in the Pindus in N. E. Epirus, and flowing S. through Epirus and central Greece into the Ionian sea, and the Peneus, also rising in the Pindus, and flowing E. through northern Thessaly into the Thermaic gulf. In central Greece are the Cephissus in Phocis and Bœotia, and the Asopus in Bœotia. In the Peloponnesus are the Alphens in Arcadia and Elis, and the Eurotas in Laconia. Small lakes are numerous, and there are several of noteworthy size: Nessonis and Bœbeis in Thessaly, Trichonis in Ætolia, Copais in Bœotia, and Stymphalus and several others in Arcadia.—The climate of Greece, which is generally temperate and pleasant, would appear to have been more generally healthy in ancient times than of recent years. Such of the classic authors as allude to it, speak of it as peculiarly bracing and invigorating, and do not notice the malarial tendencies which now render the summer months unhealthy except in the higher regions. The denser population and the universal cultivation of the land in ancient times probably in part prevented this evil. The mineral and vegetable productions of the country will be noticed in treating of the modern kingdom. Of the fauna of the peninsula it is also unnecessary to speak here, as the races of domesticated animals are the same in modern times as among the ancient peoples; while the few kinds of wild animals (wolves, wild boars, and bears) did not differ from those common to the southern parts of Europe. Traditions seem to indicate that lions may have been found in the country at a very early period.—The questions of the origin and race characteristics of the ancient inhabitants of Greece are inextricably connected with the early history of the country; they are treated to some extent in the articles on the different divisions, and will be further noticed in the historical portion of this article. Trustworthy estimates of the numbers of the population, even at the best known periods of Grecian history, are altogether wanting.—The early history of Greece is involved in obscurity, and confused by tradition and fable. Whether the first emigrants from Asia found in Greece aboriginal tribes whom they subdued or with whom they united, or whether they found the land unoccupied, there are no means at present of deciding.





The earliest authentic traditions represent the new comers as arriving among autochthonous populations, and bringing with them religion and the arts from their primeval home. The Greeks were fond of tracing their origin back to a common ancestor, Hellen, the son of Deucalion and Pyrrha, the survivors of the deluge; and the great divisions of the race, the Dorians, Æolians, Ionians, and Achæans, claimed to be descended from Dorus and Æolus, sons of Hellen, and Ion and Achæus, sons of Xuthus, the third son of Hellen. According to the popular belief, Æolus succeeded Hellen as king of Phthia in Thessaly, and his descendants spread over central Greece as far as the isthmus of Corinth, and occupied the W. coast of the Peloponnesus. The Dorians, from which race the Spartans of the historic time were descended, were confined to Doris, between Thessaly and Phocis; the Ionians, the progenitors of the Athenians of the historic period, occupied Attica and the north of the Peloponnesus; the Achæans in the heroic age occupied Mycenæ, Argos, and Sparta, in the Peloponnesus, and the original abode of the Hellenes in Thessaly. The first inhabitants of Greece were called Pelasgians by the Greeks themselves, and were considered by them as a different race from the Hellenes, with a different language. Whether the Pelasgians themselves came in from Asia, at a period beyond the reach of tradition, cannot be satisfactorily determined. The most consistent hypothesis is that which considers the Pelasgic populations as representing the body of the primitive inhabitants of Greece, and as having formed the basis of the subsequent nationalities. We may consider the Hellenic as representing the later and more civilized accessions, which, blending with the Pelasgic, developed that peculiar type of intellectual character which distinguished the Greek from every other ancient race. It was believed that Egyptian and Phœnician immigrants, arriving at a very early period, and bringing with them arts, culture, and religious rites, from countries of a much more ancient civilization, contributed largely to this result. Thus Cecrops, according to the traditions, brought civilization from Sais in Egypt to Athens; and the name of Cecropia, borne by the Athenian Acropolis, commemorated this. Argos was founded by Danaüs, who fled from Egypt with his fifty daughters, to escape the persecutions of the fifty sons of Ægyptus. Pelops led a colony from Asia Minor, and gave the name of Peloponnesus to the S. peninsula. Cadmus came from Phœnicia to Thebes, and introduced the Phœnician art of writing. It is quite possible that all these legends may have their origin in historical facts. It is certain that there was a frequent intercourse by sea in the earlier periods between the Greeks and Phœnicians; and the Greek alphabet, at whatever time it was introduced, is apparently of Phœnician origin. E. Curtius, a high authority, has recently elaborated the theory

of the early Ionians. (See IONIANS.) The heroic age of Greece is the legendary period in which flourished a race of men represented as being descended from the gods, and who are called heroes, a term implying the possession of a nature superior to that of common mortals, as Hercules, Theseus, and Minos. In this period were placed by the poets a series of expeditions and exploits, famous in the literature of Greece, as the voyage of the Argonauts in search of the golden fleece, the war of the seven chiefs against Thebes, the war of the Epigoni, and, last and most famous of all, the siege and capture of Troy, and the return of the heroes, which form the conclusion of the heroic age. Here, too, we may reasonably suppose that historical facts furnished the germ of the legends; but as the whole treatment of them is poetical, it is impossible to separate fact from fiction with any certainty or even probability. The poems of Homer contain all that we know of the manners and society of the heroic age; and the general delineations of heroic society, as given in them, may be received as representing substantially what was believed by the Greeks themselves in the subsequent period. Among the later legends are those of the migrations of the Boeotians from Thessaly into the country called from them Bœotia, said to have taken place 60 years after the fall of Troy; and the conquest of the Peloponnesus by the Dorians, placed 20 years later. They were said to have been led by the descendants of Hercules, who claimed the possession of the country as an ancestral right. This enterprise gave rise to the Dorian states of the Peloponnesus, and is known in history as the return of the Heraclidæ. The establishment of Greek colonies in Asia Minor belongs to the period following the Trojan war. The migrations appear to have continued through several ages, and were, partly at least, owing to movements and disturbances among the populations of Greece. In the course of time Greek colonies were spread over the whole W. coast of Asia Minor, and numerous cities were founded. The N. portion of the coast, with the islands of Tenedos and Lesbos, was occupied by the Æolians; the Ionians took the central part, with the islands of Chios, Samos, and the Cyclades; while the S. W. corner, with the islands of Rhodes and Cos, was settled by the Dorians. The Æolian migration was the earliest, but the Ionian was the most important. There were eleven Æolian cities in historical times. The Ionians formed twelve states united by the worship of Poseidon at the Pan-Ionic festival. The Dorians had six colonies, which formed the confederation of the Doric Hexapolis. We have no trustworthy chronology for whatever of historical events may form the basis of these traditions; but there can be no question of the facts of such migrations having taken place, and we may assume the date of about 1000 B. C. as closing the period within which these

movements occurred.—The authentic history and chronology of Greece commence with the beginning of the Olympiads, 776 B. C. At this period we find Greece divided into a number of small states, under separate governments, united into confederacies for permanent or occasional objects, but with no central government to control the whole. The Grecian world was, however, bound together by language, blood, common religious rites and festivals, social institutions and laws, which distinguished it from the barbarian nations and races about it. The language was divided into dialects, but with sufficient resemblance to each other to be easily understood by all. In the religious systems, particular deities were specially worshipped by particular tribes and at particular places, but the general principles were everywhere the same. Religious rites were periodically celebrated, at festivals in which associations of neighboring states participated, under the general name of amphictyonies, or at the great national games. The amphictyonic council, held alternately at Delphi and at Thermopylae, was partly political and partly religious. The Olympic, Pythian, Nemean, and Isthmian festivals tended strongly to keep alive the sentiment of Hellenic unity. The establishment of oracles, enjoying authority over the Hellenic world, was another bond of union. Notwithstanding these national ties, the several states of Greece could never be brought into a voluntary political union under a government having the right and power to interfere with the cherished autonomy of each individual state. Excepting in great crises of their history, such as, in the legendary times, the Trojan war, and in historical times the Persian invasion, their patriotism was local, and they never acted for a common object. Indeed, they had no common designation, as Thucydides truly remarks, until gradually the name of the Hellenes supplanted the rest.—In the early historical times the Dorians had become masters of the E. and S. parts of the Peloponnesus by invasion and conquest from the north. At the beginning of the Olympiads, Sparta, afterward the leading Doric state, was of inconsiderable importance, and her territory hardly more than the valley of the Eurotas; but her military and civil institutions, as established by the constitution of Lycurgus, gradually raised the state to a foremost place among the commonwealths of Greece. The date of the Spartan lawgiver is doubtful, but it is generally placed within the century preceding the era of the Olympiads. His ordinances, called *rhētra*, wrought great changes in the constitution of society, and produced results that acted powerfully on the course of Greek history. (See LYCURGUS, and SPARTA.) Sparta became the mistress of the greater part of the Peloponnesus by subduing the Messenians, Arcadians, and Argives. The two wars against the Messenians were the most important and obstinate; they have also a special literary interest, on account of the

poems of Tyrtæus. The first Messenian war grew out of private quarrels. It occurred about 743 B. C., and, having lasted about 20 years, ended with the complete subjection of the Messenians, who were compelled to abandon their country, and were reduced to the condition of helots or slaves. About 38 years later (685), the Messenians, under the lead of the heroic Aristomenes, took up arms, and were supported by the Argives, Arcadians, Sicyonians, and Pisatans; while the Corinthians lent aid to Sparta. At first the fortunes of war were adverse to the Spartans; but though they suffered several bloody defeats from Aristomenes, they persevered until the Messenians became a second time the serfs of the Spartans (668). In the course of the following century the Spartans extended their conquests over the greater part of Arcadia, and annexed the large Argive territory of Cynuria. In the middle of the 6th century B. C. Sparta had become the most powerful of the states of Greece. She was distinguished politically from the others by retaining the form of a royal government, royalty having become extinct everywhere else at an early period of the Olympic era. In some of the states the king became an archon for life; in others the royal house was set aside, and one of the nobles selected, under the title of *prytanis*, or president, and holding office for a limited time. This was substantially a change from monarchy to oligarchy, since the powers of government were limited to the members of the old nobility, who possessed the greater part of the land. These oligarchies were overthrown in many of the Greek states by the rise to power of able and ambitious men, called by the Greeks tyrants. The early significance of this word was limited to the irregular methods by which power was attained, and not extended to the severity with which it was administered. Though the actual government of the tyrants was oppressive for the most part, yet some of them were among the wisest men and the best rulers of the Greeks. The period of the tyrannies was about 150 years, from 650 to 500. The most celebrated of these rulers were the tyrants of Sicily, whose rule lasted 100 years, ending with Clisthenes (560); those of Corinth, beginning with Cypselus, including the great Periander, and ending with Psammetichus, about 581; and Theagenes, tyrant of Megara. A similar political condition prevailed in most of the other Grecian states in the 7th and 6th centuries. In Athens, in the legendary period, the kingly power terminated with Codrus, and was succeeded by the office of archon, at first limited to the royal family and held for life, then held for ten years, and finally thrown open to the whole body of the nobles, the number of archons increased to nine, and the period of office reduced to one year. With this last change the authentic history of Athens commences, about 683 B. C. (See ATHENS.) The legislation of Draco dates about 624, and the archonship and legislation of Solon 594.

The adoption of his constitution, and the subsequent modification of it by Clisthenes, reacting upon the original tendencies of the Ionian race to a free intellectual and political development, produced the results in letters, art, philosophy, political science, and popular eloquence, which so brilliantly distinguish the history of the Athenian commonwealth. But even in Athens a tyranny arose. Pisistratus was twice expelled, but he and his family ruled Athens with moderation, and administered the government through the Solonian institutions, until the assassination of Hipparchus converted his surviving brother Hippias into a despotic oppressor. The tyranny of the Pisistratidæ lasted about 50 years. The expulsion of Hippias was followed immediately by the popular changes in the constitution introduced by Clisthenes. The progress of Athens under the impulse of such wise and equal institutions excited the jealousy of Sparta, who made several unsuccessful attempts to overthrow the democracy. Besides the colonies in Asia Minor already mentioned, the Greeks extended their colonial system to Italy, Sicily, Gaul, Spain, Africa, and, in the north, to Epirus, Macedonia, Thrace, and the coasts of the Euxine. The Asiatic colonies were the oldest, and among them literature and the arts first developed themselves. The settlements in Italy and Sicily began about 735 B. C. The settlements in Egypt and Cyrene were commenced about a century later. About 700 the island of Corcyra was settled by Corinthian colonists, and other settlements were soon afterward made on the neighboring islands and the opposite coast; so that at the beginning of the 6th century the Hellenic race, in extent of territory and resources, was far the most powerful in the European world.—We have now reached the period when the Hellenic and barbaric races were preparing for an organized conflict. The Greeks of Asia Minor had been subjected by Croesus, king of Lydia, and were afterward ruled by Cyrus, the founder of the Persian empire. Darius, son of Hystaspes, ascended the Persian throne in 521 B. C. The revolt of the Ionian colonies from the Persian rule commenced effectively about 501, and the mother country was appealed to for aid. The Athenians voted to send a squadron of 20 ships, which, Herodotus says, "were the beginners of evil both to Greeks and barbarians." In the following year Sardis was captured and burned by the Greeks under Aristagoras, and the revolt extended far and wide. Measures were speedily taken to suppress it. The capture of Miletus and the defeat of the Ionian fleet at Lade completed the subjection of Ionia (494). This event put an end to the ancient prosperity of Ionia. Darius made preparations to follow up its reduction by the conquest of Greece itself. Placing a large armament under the command of Mardonius, his son-in-law, he sent him across the Hellespont; but the destruction of the accompanying fleet, while attempting to double the

promontory of Athos, by a hurricane, and the slaughter of a large portion of the land force by the Brygians, a Thracian tribe, forced him to return to Persia. This was the first Persian expedition to Greece (492). The Persian monarch, stimulated by Hippias, the exiled despot of Athens, made preparations on a large scale, and in 490 assembled a mighty army in Cilicia, and a fleet of 600 galleys, with horse transports. The command was given to Datis and Artaphernes. Embarking with their forces, they sailed directly across the *Ægean*, reduced the Cyclades, took Eretria in Eubœa after a siege of six days, razed the city, and put the inhabitants in chains. In a few days they crossed to Attica, and landed on the plain of Marathon. The Athenians, warned of their approach, made preparations to receive them, and though opposed by a force more than five times as great as their own, and aided only by 1,000 Plateans, they attacked the Persian army in the open field, Miltiades commanding, and won over it one of the most famous victories in history. (See MARATHON.) The Persians fled to their ships, which were stationed in lines near the shore. They lost 6,400 men, the Athenians 192. The resentment of Darius, when he received the news of the defeat at Marathon, knew no bounds. He resolved to collect the forces of his empire, and to lead them himself against Athens. Three years were occupied in making preparations on a gigantic scale; but his death postponed the threatened invasion. Xerxes, his son and successor, influenced by Mardonius, who was eager to retrieve his reputation, resolved to prosecute the plan of conquest, and to collect forces on a still more magnificent scale. Four years more were occupied with preparations. Troops from 46 different nations were assembled; a large fleet furnished by the subject maritime nations was collected; immense stores of provisions were deposited at stations along the intended line of march; a bridge was constructed across the Hellespont, and a canal cut through the narrow neck that joins the peninsula of Athos to the mainland. The bridge having been swept away by a storm, Xerxes caused two to be built in its place, one for the army and one for the baggage and beasts of burden. The preparations were completed in 481, and in the spring of 480 the march began, from Sardis to the Hellespont, where the army crossed the bridge, and approached Greece along the coast of Thrace. According to Herodotus, the military and naval forces amounted to 2,817,610, besides the accessories from the native tribes; so that when Xerxes reached Thermopylæ his army consisted of more than 2,500,000 fighting men, or including attendants, if Herodotus is to be believed, of more than 5,000,000. Though these statements are incredible, the extensive preparations made for years give us reason to believe that the army of Xerxes was one of the largest ever assembled. To make arrange-

ments to resist this mighty invasion, a congress of deputies from the Greek states was summoned to meet at the isthmus of Corinth. The Athenians and Spartans attempted to unite them for the common defence; but the terror inspired by the Persian hosts was so great that many submitted at once, and others refused to take part in the congress. The only people N. and E. of the isthmus who dared to defend the country were the Athenians, Phocians, Platæans, and Thespians. The Athenians gave the command of the forces by sea and land to the Spartans, although they furnished two thirds of the fleet. It was at first decided to make stand against the invaders at Tempe, the celebrated and beautiful valley between Mts. Olympus and Ossa, through which the Peneus flows; but this was found impracticable. The pass of Thermopylæ, a narrow defile between the mountains of Eta and the Malia gulf, was finally occupied by Leonidas, the Spartan king, with a detachment of 300 Spartan citizens and several thousand other Peloponnesians. These, with the troops of the Thespians, Thebans, and Phocians, in all about 5,000 men, prepared to hold the pass against the innumerable host of the Persians. The heroic struggle which followed is one of the best known incidents of Grecian history (see THERMOPYLÆ); but it was unsuccessful, and nothing now intervened to prevent the march of the Persians upon Athens. The naval battle of Artemisium, at the N. extremity of Eubœa, took place about the same time as that of Thermopylæ. The Greek fleet on the following day received a reinforcement of 53 Athenian ships. Another battle was fought, in which the Persians lost the greater number of ships and men; but the Greeks, unable to renew the combat, and learning that Xerxes was in possession of Thermopylæ, sailed down the Eubœan straits, rounded the headland of Sunium, and anchored in the straits of Salamis. The Athenians, dismayed at the prospect of the march of Xerxes upon the city, decided to remove with the help of the fleet to the neighboring island of Salamis. A few only remained in possession of the Acropolis, awaiting the Persians. On their arrival the Persians took post on the hill of Mars, and with some difficulty succeeded in taking the Acropolis and dislodging its defenders. The city was given a prey to the flames. The fleet at the same time made its appearance in the bay of Phalerum. The dissensions among the Grecian commanders came near producing fatal results, but Themistocles, partly by his personal influence, and partly by stratagem, prevented the separation of the fleet. The banished Aristides joined the fleet and communicated the information that the Persians were in possession of the N. W. entrance into the bay of Eleusis, thus completely surrounding the fleet of the Greeks, still lying in the bay of Salamis. Nothing was left but to fight. Early in the morning the Greeks advanced

from the shore of Salamis to attack the Persian line, stretching along the opposite coast of Attica as far as the eye could reach. The result of the battle was a great victory. The Greeks lost 40 ships, and the Persians 200, besides those which were taken with their crews. Xerxes, who surveyed the battle from a throne erected on the W. slope of Mt. Ægaleus, immediately consulted his personal safety by flight, through Bœotia and Thessaly, to the Hellespont, and crossing over to Asia by the aid of his fleet (his bridge of boats had been washed away), he returned to his capital. Mardonius was left in command of the army, but thought it prudent to postpone further operations until spring. On the same day with the battle of Salamis (according to Herodotus), the Sicilian Greeks, commanded by Gelon, gained a great victory over the Carthaginians, under the command of Hamilcar, at Himera. Before opening a fresh campaign in the spring, Mardonius made an attempt to detach the Athenians from the cause of Greece. Failing in this, he marched upon Athens, and occupied it a second time (479), compelling the citizens to move again to Salamis. Ambassadors were sent to Sparta, and after some delay a considerable force was sent into the field by the Lacedæmonians and the Peloponnesian states. Upon learning these measures Mardonius withdrew into Bœotia, and took up a position on the left bank of the Asopus near the town of Platæa. The Greek army, now amounting to 110,000 men, moved from Eleusis, and after several days of manœuvring, with skirmishes of cavalry between the outposts, fought the battle of Platæa, defeated the Persians, stormed their camp, and took an immense amount of booty. Mardonius was slain. At the same time the Persian fleet was utterly defeated at Mycale, a promontory near Miletus, by the Spartan Leotychides and the Athenian Xanthippus, who had crossed the Ægean sea in pursuit. These decisive events put an end to the Persian invasions of Greece. In the following year a fleet was sent, under the command of the Spartan regent Pausanias, to expel the Persians from Cyprus and the ports in Thrace, including Byzantium, which they still held. The expedition was successful, though it gave rise to the treacherous action of Pausanias, which, if it had not been promptly discovered and punished, might have cost the Greeks much that they had gained. The noble conduct of Athens during the Persian wars gave her at their close a commanding position in the affairs of Greece. A league was formed, entitled the confederacy of Delos, because the deputies were to meet in synod there, at the temple of Apollo and Artemis, the general object being to secure the common defence against Persian aggression by the maritime power of Athens. The members of the league were to pay an annual amount, the assessment of which was intrusted to Aristides, whose integrity of character had given him the surname of the Just. The officers

charged with the administration of the common fund were appointed by the Athenians, and bore the name of *Hellenotamizæ*. The city was rebuilt on a larger scale than before, and rapidly became the leading maritime and commercial power of Greece. It was strongly fortified, and the harbors of Piræus and Munychia were protected by a wall along their shores, and chains supported by towers at their entrance, and the fleet was annually increased by the addition of 20 triremes, under the advice of Themistocles; the constitution was also made still more popular. The rising prosperity of the Athenian state, even at this early period, began to excite the jealousy of Sparta, which attempted to interfere, but was checked by the superior craft of Themistocles. In 465, however, an expedition against Thasos presented the opportunity for a hostile manifestation on the part of the Spartans. The Thasians applied to the Lacedæmonians, who agreed to make a diversion in their favor by invading Attica; a promise they were only prevented from keeping by an earthquake in 464, which laid their capital in ruins, destroyed more than 20,000 citizens, and encouraged the helots to revolt. The Messenians, taking advantage of these calamities which had befallen their ancient oppressors, fortified themselves on Mt. Ithome, and held out more than two years, when the Lacedæmonians finally dislodged them with the assistance of their allies. Athens continued to increase in power, while Sparta was declining. The foreign policy of Pericles, now chief of the Athenian state, carried out the political principles of Themistocles, and aimed to render this the leading power of Greece. In 458-457 he began the long walls, which connected Piræus and Phalerum with Athens, thus enclosing the city and the ports in one uninterrupted series of fortifications. The Spartans, whose jealousy of Athens was still further increased, endeavored to check her power by marching into Boeotia and increasing the power of Thebes; and in consequence of intrigues of the oligarchical party in Athens, they sent an army to Tanagra, on the borders of Attica. A battle followed, in which the Lacedæmonians had the advantage, but were not decisively victorious. In 456 the battle of Enophyta was fought, and Thebes and other Boeotian towns fell under the dominion of Athens. Phocis and Locris came next. In 455 the long walls were completed, and Ægina reduced to the condition of a tributary ally. In 452 the Lacedæmonians concluded a five years' truce with Athens, which was soon after followed by the pacification known as the "peace of Cimon." (See CIMON.) The custody of the common fund at Delos was now transferred to Athens, which had rapidly become the imperial head instead of an equal member of the league. The height of her power may be dated about 448. In the following year she lost her ascendancy in Boeotia, Phocis, and Locris, and a revolt broke out in

Eubœa and Megara. Eubœa, however, was soon reduced by Pericles; but Athens never recovered her other possessions, while a formidable confederacy was organizing against her in the Peloponnesus. In 445 the Athenians concluded a truce with Sparta and her allies for 30 years. Pericles still pursued his policy of aggrandizing and embellishing Athens; but for a time he had a powerful opponent in Thucydides, the leader of the conservative party, whose banishment soon afterward left Pericles almost the undisputed master of the state. It was at this period that the city was adorned with the grand works of statuary, architecture, and painting, which made her not only the glory of Greece but the school of the world. Pericles enlarged the empire of Athens by colonization, from the shores of the Euxine to Italy. He increased the sum of the contributions to more than double the original amount. The Athenians now considered themselves the sovereign head of the league. All the important questions, all public suits, and all private suits in which an Athenian was one of the parties, were decided at Athens; and the city began to be called "the despot." The Peloponnesian war had its remote origin in the jealousies that had long been growing between Sparta and Athens, which were strengthened by the antagonism between the Ionian and Dorian institutions, the former represented by Athens and the latter by Sparta; but the immediate occasion of the commencement of this ruinous conflict was a quarrel between Corinth and her former colony Corcyra, in relation to Epidamnus, a colony established by the latter on the coast of Illyria. The Corcyraean fleet defeated the Corinthians in a battle near Actium, in 435. The Corinthians spent two years in preparing to avenge this disgrace; and the Corcyraeans applied to Athens for aid. Under the counsels of Pericles, who foresaw that war was inevitable in the end, a defensive alliance was concluded with Corcyra, and a fleet of 10 triremes was despatched for the support of that island in case of its territory being invaded. A naval battle took place off the coast of Epirus in 432, in which the Corinthians were victorious. At first the victors resolved to renew the attack and effect a landing at Corcyra; but the appearance of 20 Athenian sail in the distance caused them to change their purpose, and they returned to Corinth with about 1,050 prisoners, 800 of whom were sold as slaves, and the remainder, who belonged to the first families of Corcyra, were kept as hostages. The Corinthians, offended with the part taken by the Athenians in these affairs, assisted the Potidæans, their colonists, now tributary to Athens, who had been stirred up by Perdiccas, king of Macedon, to revolt against the imperial city. A general meeting of the Peloponnesian confederacy was called at Sparta, and deputies from the several states appeared (432). Their charges against Athens were answered by an ambassador who happened to be resident

there at the time on other business; but a large majority of the assembly voted for war. Before carrying the vote into execution, the Spartans made several demands upon the Athenians: 1, the banishment of the Alcmaeonidae, among whom Pericles himself was included; 2, the withdrawal of the Athenian troops from Potidæa, the restoration of independence to Ægina, and the repeal of a decree against Megara; 3, a recognition of the independence of the other Grecian states. Pericles in a powerful speech argued that no concessions could avert the war, and an answer in accordance with his views was returned. Hostilities were commenced the next year by an attack of the Thebans upon Plataea. The war, being thus openly begun, soon drew into its vortex nearly all the states of Greece. On the side of Sparta were ranged the whole Peloponnesus (except Argos and Achaia), the Megarians, Boeotians, Phocians, Opuntian Locrians, Ambraciotes, Leucadians, and Anactorians. The Dorian cities of Italy and Sicily were expected to furnish a fleet, and it was even contemplated to invite the Persian king to send a Phœnician squadron against Athens. The allies of the Athenians were the Chians, Lesbians, Coreyreans, Zacynthians, and afterward the Cephallenians; the tributary cities on the coasts of Thrace and Asia Minor, and the islands N. of Crete, except Melos and Thera. Archidamus, the Spartan king, leading a force of from 60,000 to 100,000 men, marched from the isthmus, where they had assembled immediately after the attack upon Plataea, crossed the Attic border, and entered the Thriasian plain early in the summer of 431. Pericles collected the inhabitants of Attica within the walls of the city, and abandoned the country to the ravages of the invaders, while he sent a fleet to lay waste the coasts of the Peloponnesus. It was not before the end of the summer that Archidamus retired from Attica and disbanded his army. The second invasion of Attica by the Lacedæmonians took place the next year. The sufferings of the people were terribly increased by the plague of Athens, of which Thucydides, one of the few of those attacked who survived, gives an accurate and powerful description. The demoralizing effects of the despair produced by this mysterious disease were worse than the physical sufferings. It was estimated that not less than a fourth of the population was carried off. In this extraordinary and calamitous state of affairs an outcry was raised against Pericles, as the author of the public misfortunes. On his return from a naval expedition against the Peloponnesus, he was accused by Cleon, a rising demagogue, of peculation, brought to trial, and condemned to pay a fine. But the popular feeling veering about, he regained his influence, and was reelected general. Soon after, however, he was attacked by the disease, which had already carried off his sister and his two sons Xanthippus and Paralus, and died of a lingering fever, which supervened upon the plague, and, in the weakened state

of his constitution, proved fatal. The death of Pericles struck a deadly blow to the Athenian cause. The men who seized the control of the state were greatly his inferiors in moral character and all statesmanlike qualities. In the second year of the war the Lacedæmonians made some attempts and did some harm to the Athenian possessions by sea. In the following winter Potidæa capitulated, having been instigated to revolt by the Lacedæmonians, and the territory was occupied by colonists from Athens. Two invasions were made in 429; and the memorable siege of Plataea, which ended two years later, commenced. After the surrender the Lacedæmonians cruelly put to death every man who fell into their hands, and utterly destroyed the city. In the same year Phormio gained several naval victories for Athens in the Corinthian gulf. In 428 Attica was again invaded. Mitylene, the capital of Lesbos, revolted, and a fleet was despatched against it. The aid of the Lacedæmonians was invoked, and succors were promised; but delays occurring in sending them, the party of the Mityleneans favorable to Athenian supremacy opened negotiations with Paches, the Athenian commander, and a capitulation was agreed upon. The leaders of the revolt were sent to Athens, where a remarkable debate was held on the question of putting the whole body of the Mityleneans to death. Cleon's savage proposal of a general massacre was at first carried by a small majority, and a trireme was despatched with orders to Paches to put it immediately into execution. But the cooler second thoughts of the people in the assembly of the following day led to a reversal of the decree; a second trireme, rowed by oarsmen stimulated by the promise of large rewards, being sent with counter orders, happily arrived in season to arrest the execution of the decree. To this period belong the bloody feuds at Coreyra, of which Thucydides has drawn a masterly picture. The year 426 was marked by calamities of another kind—by floods, earthquakes, and the reappearance of the plague at Athens. In 425 the Athenians established a garrison at Pylos, the modern Navarino; an act which recalled the Peloponnesian fleet from Coreyra, and the army from Attica, where they had been only 15 days. An assault was made, led by Brasidas, with the intent to expel the Athenians, but it was not successful; and while the Lacedæmonians were preparing to renew it, the Athenian fleet entered the port, and in the battle that ensued gained a decisive victory. The Athenians now blockaded the Lacedæmonians, shut up on the little island of Sphacteria. The besieged were reduced to such straits that an armistice was solicited to enable the Lacedæmonians to send to Athens and sue for peace. The Athenian assembly, under the influence of Cleon, insisting on extravagant terms, the war was resumed. Demosthenes, the Athenian general, not succeeding as quickly as was hoped in reducing the garrison, sent to Athens for further assis-

tance, communicating at the same time intelligence of the actual state of the siege. Cleon vehemently attacked the conductors of the war, and boastfully declared that if he were general the island would be captured without delay. Unexpectedly to him, the people took him at his word. Unable to decline the honor thrust upon him, Cleon departed to the scene of his command; and, by availing himself of the preparations Demosthenes had already made, he was able to keep his promise, and arrived at Athens with the Spartan prisoners in 20 days after his departure. The Athenian fleet, after the victory, proceeded to Coreyra, and witnessed another series of political massacres, without attempting to prevent them. In 424 the Athenians were defeated at Delium, and met with severe losses in Thrace, while Nicias was reducing Cythera and garrisoning its principal towns. The Lacedæmonians added to the customary atrocities of war the murder of 2,000 helots whom they pretended to emancipate. The Athenians sent expeditions against Megara and Boeotia, the former of which was only partially successful, and the latter a disastrous failure—the defeat of Delium, already mentioned. These reverses, especially the defeats in Thrace, disheartened the Athenians. In 423 a truce was concluded for a year, with a view to a permanent peace. But the negotiations were interrupted by the revolt of Scione to Brasidas, and hostilities in that quarter were renewed. In 422 Cleon was despatched to the north, with a fleet and army; but he showed his incompetency to encounter Brasidas, and fell in a disgraceful retreat before that general from Amphipolis, where Brasidas himself also fell. In 421 the peace of Nicias was concluded, followed by an alliance offensive and defensive between Athens and Sparta. An attempt was soon made to form a new confederacy under the leadership of Argos, excluding Athens and Sparta. Difficulties sprang up between these two states, which were fomented by Alcibiades, who had now risen to influence in Athens, and bore a private grudge against Sparta; he advocated a league with Argos, and resorted to tricks and intrigues to carry his point. Accordingly in 420 a treaty for 100 years was made with Argos, Elis, and Mantinea. In 418, in consequence of these events, and the insolence of Alcibiades, the Lacedæmonians sent an army into the territory of Argos, and the battle of Mantinea crowned the Spartan arms with victory over the Athenian and Argive forces. Civil discords and revolutions and counter revolutions followed at Argos. In this same year the Athenians conquered the island of Melos, and, on the proposal of Alcibiades, put the men to death, sold the women and children into slavery, and established an Athenian colony on the island.—The feuds that distracted Greece broke out with baneful effect in the Sicilian and Italian colonies. This led to the intervention of Athens. In 427 Gorgias of Leontini was sent to Athens to ask

succor for his countrymen. A squadron of 20 ships was immediately sent, and in 425 another of 40; but the Sicilians were alarmed, and the expeditions were without effect. Another application was made in 422, but unsuccessfully. In 416 Segesta, having a quarrel with Selinus, sent an embassy for aid, the Syracusans having taken sides with the Selinuntines. Alcibiades supported the demands of the Segestans, in opposition to the policy of Nicias and his party. It was decided to send a fleet of 60 triremes, under the command of Nicias, Alcibiades, and Lamachus, in the expectation not only of assisting Segesta and Leontini, but of extending the power of Athens over all Sicily. Three months were spent in making preparations on a grand scale, and the greatest enthusiasm prevailed. Just as the armament was on the point of sailing, the superstitious terrors of the Athenians were roused by the mutilation of the Hermæ, or square pillars surmounted with the head of Hermes, standing in the streets and public squares, and the public suspicion fell upon Alcibiades as the author of the sacrilege. This crime, together with the profanation of the Eleusinian mysteries by a private representation, was charged upon him by Pythonicus, in the public assembly. But instead of an immediate investigation, his political enemies caused it to be postponed till his return; and the fleet departed from the Piræus (415). The rendezvous was appointed to be held at Coreyra, whence the combined fleet of the Athenians and their allies sailed for the Japygian promontory, and thence to Rhegium, where they awaited the return of the fast-sailing triremes which had preceded the main body to Segesta. The reports brought back were not very encouraging, and there was a difference of opinion among the generals. Alcibiades was met at Catana by a summons to return to Athens, and take his trial on the charge of profaning the Eleusinian mysteries. The state ship *Salamina* brought the order; but on the way home Alcibiades escaped. The trial went on according to Athenian usage, and though absent, he was condemned to death. After some months' delay Nicias commenced operations against Syracuse, and having gained a victory retired to Catana, and afterward to Naxos, into winter quarters. The Syracusans occupied the winter in preparations for defence. In the following spring (414) the siege of Syracuse was commenced. Just as the Syracusans were on the point of surrendering, Gylippus the Spartan arrived in Sicily with a small force, and landing at Himera, on the N. coast, levied an army, and marched upon the city. This changed the face of affairs, and put to flight all thoughts of surrender. Two naval battles were fought in the great harbor. In the first the Athenians gained the advantage, but they were defeated in the second. Meantime, the Lacedæmonians at home had ravaged the Argive territory, and the Athenians had sent a fleet against Epidaurus. In 413 the Lacedæ-

monians invaded Attica and established themselves in Decelea, acting under the advice of Alcibiades, who had passed over from Italy to the Peloponnesus. Yet the Athenians resolved not only to ravage the coast of Laconia, but to send reinforcements to Sicily. They accordingly despatched 75 triremes, under the command of Demosthenes, with 5,000 heavy-armed and a large body of light-armed troops. After several unsuccessful attempts upon the outer positions, and when sickness broke out among the troops, it was found necessary to withdraw from the great harbor; but an eclipse of the moon, occurring on the appointed night, prevented their departure. This fatal delay gave the Syracusans an opportunity of attacking them by land and sea. Glyippus suffered a repulse by land; but the Athenian fleet was defeated, and Eurymedon the commander slain. The entrance to the harbor was blocked up. A terrible battle was immediately fought, the Athenian fleet driven ashore, their crews leaping out, and flying to the camp for refuge. Escape by sea was now cut off; the ships were all abandoned to the enemy; and in attempting to retreat by land, the divisions of the army, greatly reduced by their sufferings, were successively surrounded and made prisoners. The captives were set to work in the stone quarries of Achradina and Epipolæ, and Nicias and Demosthenes were doomed to death. The calamitous close of this expedition overwhelmed the Athenians with sorrow and despair, and the popular fury vented itself on those who had proposed or encouraged the enterprise. The occupation of Decelea by the Lacedæmonians still harassed the city, keeping it almost in a state of siege. The consequences soon began to be felt in the defection of the allies and subjects, who were encouraged and aided by Sparta in throwing off the yoke. Alcibiades was actively engaged in stirring up the spirit of revolt. But the Athenians were not long in taking measures to remedy as well as they could these terrible disasters. They appointed a committee of public safety, under the name of *probuli*, commenced a new fleet, and fortified Sunium. Acting under the advice of Alcibiades, the Lacedæmonians sent a fleet in aid of the Chians. The movement was successful, and other cities and islands on the Asiatic coast followed the example of revolt. The Athenians now appropriated the fund of 1,000 talents reserved by Pericles to fitting out a fleet against the Chians; but the revolt continued to extend, embracing Teos, Lesbos, and Miletus. The Samians remained faithful, and Samos became the headquarters of the Athenian fleet. Several victories soon crowned the changing fortunes of Athens. By this time Alcibiades, whose manners also were offensive to the Spartans, excited their distrust by his intrigues with the Persians. At length he brought matters to such a pass that the Athenians, pressed by the necessities of their condition, agreed to restore him, and to change the constitution to

an oligarchy, on condition of aid from Persia. A revolution was effected, and the government of the 400 established, with the power of convening a select body of 5,000 citizens whenever they saw fit; but the expected aid from Persia was not received. The 400 opened negotiations with Agis, the Spartan king. But dissensions broke out, a counter revolution was partially successful, and the democratic constitution was maintained in Samos. The Lacedæmonians failed to seize the opportunity of striking a blow by taking the Piræus, but the Athenian fleet was defeated at Eretria in Eubœa. The old constitution was finally restored, and several leaders of the oligarchical party, among whom was Antiphon the orator, were put to death. From this period, although the Lacedæmonians still held possession of Decelea, the war was mainly carried on by sea. An attempt was made by Mindarus, the Lacedæmonian commander, to effect a revolt of the Athenian dependencies in the neighborhood of the Hellespont. Thrasyllus the Athenian followed him, and the battle of Cynossema, in which the Athenians were victorious, was fought (411); the shattered remains of the Lacedæmonian fleet were wrecked off Mt. Athos. Another battle was soon after fought near Abydos, which was decided in favor of the Athenians by the arrival of Alcibiades from Samos. A third battle was fought near Cyzicus the next year, and, the Spartan running his ships ashore, Mindarus was slain, the fleet taken, and the Athenians became again masters of the Propontis. The Lacedæmonians now offered peace; but the Athenians, elated by their recent victories, and influenced by the harangues of Cleophon, an influential demagogue, rejected the terms. In the two following years the Athenians recovered Selymbria and Byzantium, chiefly through the active services of Alcibiades; and in 407, after an exile of eight years, he was fully restored, the sentence against him was annulled, and he was placed with unlimited powers at the head of all the forces of the republic, by land and sea. In the mean time Cyrus, the younger son of Darius II., was sent down as satrap to the provinces of Lydia, Phrygia, and Cappadocia, and the able Lysander was sent from Sparta to take command of the Lacedæmonian fleet. They resolved to act in concert. Alcibiades sailed from Athens to Andros, where he left a part of the fleet under Conon to prosecute the siege, and proceeded to Samos. He attempted to raise money by force; and while absent from Samos on this business his pilot Antiochus, contrary to his orders, hazarded a battle, and sustained a defeat. These events, and the profligate conduct of Alcibiades, lost him the confidence of the Athenians, and he was deprived of his command. Ten new generals, the chief of whom was Conon, were appointed to supersede him. A battle was fought between Conon and Callicratidas, the successor of Lysander, in the harbor of Mitylene, in which Co-

non lost 30 ships; but the Athenians, learning this disaster, despatched with incredible speed 110 triremes, and a great battle followed near the little islands called Arginuse, in which the Lacedæmonians lost 77 vessels (406). The generals were brought to trial at Athens on a charge of not collecting the bodies of the dead for burial, and six of them were executed in a moment of popular frenzy. Socrates, who happened to be one of the presiding officers at the public assembly, protested against the proceeding and refused to put the vote; but the next day a more pliant officer went through the form, and the great crime was consummated. Callicratidas having perished in the battle, Lysander was reinstated in the command in 405; and proceeding to the Hellespont, he took up his station at Abydos. The Athenians, hearing of this movement, also sailed to Ægospotami near Lampacus, which Lysander was besieging. After five days of manœuvring, the momentous battle was fought which put an end to the war by the ruin of Athens. Conon escaped with only 8 or 10 ships, out of 180; 3,000 or 4,000 Athenian prisoners were put to death, with the generals. It was in September, 405, that Lysander received the submission of the Athenian cities, and established in them oligarchies of ten (decarchies). He reached Athens in November, and the Peloponnesian army marched into Attica, encamping near the city, on the grounds of the academy. After three months of dreadful sufferings by famine, the Athenians surrendered; and in March, 404, Lysander took formal possession of the city. The conditions of the surrender were executed; the walls and fortifications were dismantled to the music of the flute; the arsenals were destroyed, the ships on the stocks burned, and all the fleet except 12 triremes carried off by Lysander. The government of the thirty, called the thirty tyrants, was established, and Lysander, sailing to Samos, soon reduced that island, and then returned to Sparta loaded with honors. The government of the thirty soon made themselves feared and hated, establishing by their tyrannical and bloody acts a reign of terror. It is said that 1,500 persons were executed without trial. Alcibiades was included in the list of exiles; but he was put to death by Pharnabazus, the Persian satrap, in compliance with orders transmitted from Sparta to Lysander. The state of feeling in Greece soon began to turn against the Lacedæmonians. They had shown a grasping disposition, and Lysander, puffed up by his military successes, was haughty and tyrannical. Thrasybulus and other Athenian exiles ventured to seize the fortress at the pass of Phyle, on Mt. Parnes, and the thirty were repulsed in an attempt to dislodge them. The thirty, feeling their position insecure, resorted to still more atrocious and bloody means of perpetuating their power; whereupon Thrasybulus marched down to Piræus and occupied the hill of Munychia. The thirty, with the whole force at their com-

mand, attacked them; but Thrasybulus fell upon and defeated them, and slew 70, with Critias their leader. A new government of ten was established at Athens, and the aid of the Lacedæmonians was invoked. Pausanias, having superseded Lysander, led an army into Attica, and after several unimportant combats terms were agreed upon (403); the exiles were restored; the democracy was reestablished, with all the old administrative bodies; the acts of the thirty were annulled, and the old laws revised, and inscribed on the walls of the Pæcile Stoa, in the full Ionic alphabet of 24 letters, then for the first time introduced into the public records. In 401 occurred the episode of the Anabasis, or expedition of Cyrus the Younger, which is connected with the history of Greece by the circumstance that his army consisted in part of Greek mercenaries, and that Xenophon the historian served as volunteer, and conducted the Greek troops back to the sea, after the battle of Cunaxa.—The period following the downfall of Athens is that of the Spartan supremacy, which lasted 34 years, from 405 till the battle of Leuctra, 371, although her maritime power was greatly diminished by the battle of Cnidus, in 394. The conquest of Elis in 402 extended her power in the Peloponnesus; but she soon entered upon a course of degeneracy and decay. The intrigues of Lysander, and the large sums of gold and silver introduced into the country, tended to change and corrupt the ancient character of the Lacedæmonians, and to produce great inequalities in the condition of the citizens. Troubles soon broke out in Asia Minor, and a Lacedæmonian force under Thimbron was despatched to protect the Ionian cities against Tissaphernes, the Persian viceroy of Asia Minor. He was succeeded by Dercylidas. In 397, after several encounters, an armistice was agreed upon; but Pharnabazus, the rival of Tissaphernes, seized the opportunity to organize a fleet, which was placed under the command of Conon, who since the defeat at Ægospotami had lived under the protection of Evagoras, prince of Salamis in Cyprus. Agesilaus invaded Asia with a powerful army in 396, and in 395 marched upon Sardis. Tissaphernes was put to death, through the influence of the queen mother Parysatis, and his successor Tithraustes made an armistice of six months with Agesilaus, who in the mean time was appointed to the command of the Lacedæmonian fleet in addition to that of the army. A new fleet of 120 triremes, under the command of Pisander, was sent out by the Lacedæmonians the following year. In August, 394, the great battle of Cnidus was fought, in which more than half of the Lacedæmonian fleet was destroyed, and Pisander fell. In the mean while discontents in Greece itself with the Spartan power were eagerly fomented by Persian agents, and hostilities breaking out between Sparta and Thebes, Athens was called in by the latter. Lysander was slain in an action at Haliartus (395), and

Pausanias was obliged to retreat. An alliance was formed against Sparta between Athens, Corinth, Argos, and Thebes, and many other states soon joined it. A meeting was held in 394 at Corinth, and in this alarming state of affairs Agesilaus was recalled from Asia. The battle of Corinth, in which the Lacedæmonians gained the victory, was fought in July, 394, nearly at the same time with the battle of Cnidus. Agesilaus received the news at Amphipolis, on his way from Asia; and on the frontiers of Phocis and Bœotia he heard of the defeat and death of Pisander at Cnidus. Pressing forward, he met the confederate army at Coronea, where a terrible conflict took place, ending in a victory, though not a decisive one, for Agesilaus. The defeat of Cnidus cost the Spartans the maritime supremacy they had acquired at Ægospotami. The Spartan harmosts (governors) were expelled from the islands. In 393 the coast of Laconia was ravaged by Conon and Pharnabazus; the long walls of Athens and the fortifications of Piræus were rebuilt, and Athens had regained something of her former power, by laying again the foundations of maritime supremacy. The war continued during the following year, in the neighborhood of Corinth, the Spartans making their headquarters at Sicyon, and ravaging the Corinthian plain, besides gaining the advantage in several skirmishes. The triumphant career of the Spartans was interrupted by the victories of Iphicrates, an Athenian commander of a body of mercenaries. Agesilaus returned stealthily to Sparta, and many places in the Corinthian territory were retaken by his aid. The Lacedæmonians sent Antalcidas to negotiate with the Persians, in the hope of regaining their good will; and Tiribazus secretly furnished the Spartans with money, and treacherously seized Conon, who now disappears from history. In 389 a fleet of 40 triremes was despatched from Athens to Asia Minor, under Thrasybulus; but after reëstablishing the Athenian supremacy in several places on the Hellespont, he was surprised and slain at Aspendus. Anaxibius was sent from Sparta to succeed Dercyllidas as governor of Abydos, and Iphicrates was despatched from Athens. He attacked Anaxibius among the passes of Ida, defeated his army, and slew him with 12 other harmosts, thus giving the Athenians again the mastery of the Hellespont. But the Æginetans began to infest the trade of Athens, and the Lacedæmonians, under Teutentius, took Piræus by surprise, and carried off a considerable amount of booty. In 387 the treaty of Antalcidas was concluded, on terms that were denounced by the Athenian writers a few years later as most disgraceful, but the deputies from the states felt obliged to yield their assent. In substance it provided that the cities of Asia and the islands of Clazomenæ and Cyprus should belong to Persia, and, with the exception of Lemnos, Imbros, and Scyros, which were to remain to Athens, all the cities should be independent. Sparta now com-

menced a series of aggressions in Bœotia. Plataea was rebuilt for a Spartan outpost. Mantinea, against which Sparta owed a grudge, was reduced, dismantled, and placed under an oligarchy. In 383 the affairs of Olynthus, the centre of a powerful confederacy at the head of the Toronaic gulf, attracted the attention of Sparta; and Eudamidas was despatched to the defence of Acanthus and Apollonia, but his army was not sufficiently strong to take the field at once against the Olynthians. Another force was collected by Phœbidas, the brother of Eudamidas, and marched to Thebes, where they treacherously got possession of the Cadmea or citadel. The indignation which this act excited induced the Lacedæmonians to disavow it, and to dismiss Phœbidas; but they continued to occupy the citadel with a garrison, and Thebes was enrolled as a member of the Lacedæmonian confederacy. The war with Olynthus was closed in 379, with the capitulation of the city, and the dissolution of the league of which she was the head; a great misfortune, as the event proved, to Greece. In 379 a revolution was brought about at Thebes, chiefly by the young Pelopidas, who was living in exile at Athens, and who arranged a conspiracy with some of the leaders of the patriotic party at Thebes, which was carried into successful execution. The garrison capitulated, the exiles returned, and the revolution shook the influence of Sparta throughout Greece. Athens set vigorously to work to organize a new confederacy, and Thebes enrolled herself as one of the earliest members. A congress was held in Athens, and a large army and fleet voted. The war with Sparta was zealously prepared for. At Thebes the famous "sacred band" was formed, and Pelopidas and Epaminondas were actively engaged in organizing the war. Agesilaus marched from Sparta into the Bœotian territory, and laid waste the country, to the gates of Thebes; in the following year he conducted a second expedition, in which he received an injury that withdrew him from active service. The next expedition was accordingly conducted by Cleombrotus; he was forced to retreat by the Thebans, who had seized the passes of Cithæron. In 376 a Lacedæmonian fleet under Pollio was defeated by Chabrias the Athenian near Naxos; and Timotheus, another Athenian, son of Conon, sailed to the west of Greece, and gained over to Athens Cephallenia, Coreyra, and many of the Epirotes and Aearnians. Dissatisfaction and jealousy sprung up among the confederates of Athens. Thebes was extending her dominion over the neighboring states, and in 375 Pelopidas gained a victory over the Lacedæmonians at Tegyra. In 374 the Thebans had completely expelled the Lacedæmonians from Bœotia, and menaced Phocis. The Athenians made with Sparta a peace which was immediately broken, and the successes of the Athenian army on the western coast of Greece so alarmed the Spartans that in 372 Antalcidas was again despatched to solicit the aid of Per-

sia. Fresh negotiations were opened, a congress was held in Sparta in 371, and the peace known as the peace of Callias was ratified by all except Epaminondas, the representative of Thebes. Hostilities between the Thebans and Lacedæmonians commenced almost immediately, and the great battle of Leuctra established the ascendancy of Thebes, while striking a destructive blow at the power of Sparta. Jason, the despot of Phæra, joined the Thebans; but, instead of renewing the attack, he used his influence in effecting a truce by which the Lacedæmonians were allowed to withdraw from Bœotia. The Athenians, dreading the power of Thebes, now formed a new coalition, including most of the Peloponnesian states. In 370 Epaminondas entered the Peloponnesus, laid waste the valley of the Eurotas, built Megalopolis, which he peopled with Arcadians, and the town of Messene, on Mt. Ithome, recalling the exiled Messenians. Sparta applied to Athens for help, and an alliance was formed to prevent the Thebans from invading the Peloponnesus. But Epaminondas forced his way through the Oean mountains, and joined his allies, though nothing of importance was accomplished, when both armies dispersed and returned home. In 368 Pelopidas led an expedition to Thessaly against Alexander, the despot of Phæra; thence he marched into Macedonia, and made an alliance with Ptolemy, the regent, who gave hostages for the observance of the treaty, among whom was Philip, afterward the king of Macedon. Soon after this the Arcadians were defeated by the Lacedæmonians. Epaminondas entered the Peloponnesus again, in order to bring the Achæans, hitherto confederates of Sparta, into the Theban alliance. He succeeded; but a counter revolution was soon after effected, and the Achæan cities went back to Sparta. In 367-'6, accompanied by deputies from their allies, Pelopidas proceeded to Susa on an embassy to the Persian court, and Thebes was declared to be the head of Greece, in spite of the opposition of the Athenians and Arcadians; but the Persian rescript was not received with favor even by the allies of Thebes. Pelopidas having been seized by Alexander of Phæra, in a mission to Thessaly, an army was despatched for his rescue; and the troops, being in danger from the pursuit of the Thessalians and Athenians, called Epaminondas, who was serving in the ranks, to the command, and under him were safely brought back to Thebes. Epaminondas was restored to the command of the army by the people, and immediately undertook another expedition for the release of Pelopidas, which was entirely successful. The Athenians meantime sent a fleet into the Ægean sea under command of Timotheus, and took Samos, Potidæa, Pydna, Methone, and perhaps Olynthus. Thebes, jealous of the growing power of Athens, resolved to try her fortunes on the sea. Epaminondas told his countrymen that they must not be content until they had transferred the Propylæa of the Acropolis to the

Theban Cadmea. He appeared in 363 with a fleet of 100 triremes in the Hellespont; but he accomplished little, and this was the only maritime expedition undertaken by the Thebans. About the same time Pelopidas, leading an army against Alexander of Phæra, defeated him at Cynosephale, but was himself slain in the moment of victory. Alexander was compelled to limit himself to Phæra, and to become a subject of Thebes. A war in the mean time was waged between Elis and Arcadia, and the presidency of the Olympic games was transferred from the Eleans to the Pisatans (364). The Eleans asserting their rights by force, the temple of the Olympian Jupiter was converted into a fortress. The Eleans were repulsed, but they afterward struck the 104th Olympiad out of the catalogue. In 362 Epaminondas undertook his last invasion of the Peloponnesus, in consequence of the acts of the Arcadians. He attempted to surprise Sparta; but though he entered the city, finding that his movements were anticipated, he retired. The hostile forces now concentrated in the plain between Tegea and Mantinea. A battle was fought, in which the Theban commander gained a great victory over the Mantineans and Lacedæmonians, but, while fighting in the foremost ranks, lost his own life. Peace was immediately afterward made, in accordance with his dying advice.—We now come to the Macedonian period, which closes the brilliant independent existence of the Grecian commonwealths. The wars of which we have given a rapid sketch exhausted the resources and demoralized the character of the Greeks, and prepared the way for any powerful neighbor to build up an empire on the ruins of Hellenic independence. For many years the princes of Macedon, claiming to be of Hellenic lineage, had been growing in power, though in the midst of barbarism. Philip, son of Amyntas II., was sent in his youth as a hostage to Thebes, and there acquired a taste for Greek literature, and learned the art of war as improved by Epaminondas. At the age of 23 (359) he became king of Macedon. In 358 he took Amphipolis after a siege, and thus came into collision with Athens, to which Amphipolis formerly belonged. He secured the good will of the Olynthians by taking Potidæa and bestowing it upon them. In the same year (356) Philip gained the prize in the chariot race at Olympia, and a victory over the Illyrians. Athens was occupied in the mean time with the social war—a war with her former allies, which commenced in 358, and ended in 355. The sacred war broke out near the same time between Phocis and Thebes, in the midst of which Philip began to interfere in the affairs of central Greece, assuming the character of defender of the god at Delphi. The Thessalian army was defeated near the gulf of Pagasæ in 352; but his march against Phocis was arrested at Thermopylæ by an Athenian force posted there. He then turned his arms northward to Thrace and the Cher-

sonesus. It was at this time that Demosthenes, penetrating the ambitious designs of Philip, came forward as his opponent; but little was done to check a danger which seemed so distant and uncertain, notwithstanding the orator's vehement appeals. In 350 Olynthus, alarmed at the encroachments of Philip, sent envoys to Athens to demand assistance; and their demand was supported by Demosthenes, in the three Olynthiac orations; but a strong party headed by Phocion opposed him. Philip prosecuted his schemes almost uninterruptedly until Olynthus fell into his power (347), betrayed by two of the leading citizens, Lasthenes and Euthycrates, and the Chalcidian peninsula became subject to Macedon. Demosthenes now put forth strenuous efforts to organize a confederacy of the Grecian states, but without success. Overtures were then made for reconciliation with Thebes, to which the sacred war had become burdensome and exhausting; and Philip, observing this tendency of things, and unwilling that such a combination of powerful states should take place, made advances to Athens. Ambassadors were despatched to Philip, among whom were Philocrates, the author of the measure, Demosthenes and Æschines, the orators, and Aristodemus, the actor. Some of the ambassadors were gained over to Philip's interest by bribery, as was charged by Demosthenes; and Philip immediately sent envoys to Athens, who arranged a treaty. A second embassy was sent from Athens to receive from Philip the oath of ratification, with instructions to proceed at once to him wherever he might be. Instead of this, they went to Pella, and remained there until his return from Thrace, where he was engaged in an expedition against Kersobleptes, an ally of the Athenians. The treaty was finally ratified at Phere, after nearly three months' delay; but the Phocians were excluded, and Philip immediately passed the defile of Thermopylae, and all the towns of Phocis at once surrendered. Philip then proceeded to Delphi, and called an assembly of amphictyonic deputies, who decreed that all the Phocian cities except Abœ should be destroyed, and that they should repay by yearly instalments the treasures they had plundered from the temple, estimated at 10,000 talents, or about \$10,000,000. The two votes formerly held by the Phocians in the amphictyonic council were transferred to the king of Macedon; Sparta was deprived of her rights there; and Philip was to share with the Thebans and Thessalians the right of presiding at the Pythian games. These events occurred in 346. Macedon was now the leading power in Greece. Philip commenced a series of intrigues in the Peloponnesus, which Demosthenes endeavored to counteract by his personal presence, but with no result. Philip now began his preparations for an attack on the Persian empire, which he had probably long meditated, by marching against Thrace (342), and menacing the Athenian possessions

in the Chersonesus, which brought his forces into conflict with Diopithes, who, not limiting himself to the defensive, invaded the places in Thrace which had submitted to Philip. The Macedonian king complained of these proceedings, but Diopithes was defended by Demosthenes, and retained in the command. In 341 Philip continued his movements, captured Selymbria, and attacked Perinthus, but not succeeding in taking it immediately, left a part of his army to continue the siege, and marched upon Byzantium. He addressed a letter to the Athenians, charging them with violating the peace. Demosthenes persuaded them to equip a fleet, which was unfortunately placed under the command of Chares, and the expedition was a failure. Phocion was then appointed in his place, and, sailing with 12 triremes, forced Philip to raise the siege of Byzantium and Perinthus, and to withdraw from the Chersonesus. In 339 the amphictyonic council declared war against the Amphissian Locrians, for encroachments on the sacred lands of the temple at Delphi. Cottyphus was first appointed to the command of the amphictyonic forces; but failing in the object of the appointment, the amphictyons gave the command to Philip. Early in 338 he commenced his march; but instead of proceeding directly to Amphissa, he seized Elatea, a town in Phocis, which commanded one of the principal approaches to Boeotia and Attica. This movement, when known in Athens, produced great excitement and alarm. An assembly was summoned the next morning. Acting under the advice of Demosthenes, an embassy was despatched to Thebes, of which Demosthenes himself was the leading member; they met ambassadors from Philip, who was anxious to prevent a union between the two cities. The earnest and eloquent representations of Demosthenes carried the day, and an alliance was made. The united armies of Thebes and Athens took the field, and, after gaining the advantage in two skirmishes, fought a decisive battle on the plain of Charonea. The fortunes of the day were decided by a charge made by the young Alexander upon the Theban sacred band, which was cut to pieces. The allied army was utterly defeated—an event fatal to the independence of Greece. At Athens the greatest consternation prevailed, but vigorous measures were taken to put the city in a state of defence, and Demosthenes was appointed superintendent of the fortifications. Philip showed great moderation toward the Athenians, offering them favorable terms of peace, and dismissing their prisoners without ransom. The Thebans were more severely dealt with; the exiles were restored, the government was transferred to them, and a Macedonian garrison was placed in the Cadmea. Philip called a congress of the states at Corinth, at which war was declared against Persia, and he was made commander-in-chief. In the autumn he returned to Macedonia to

make preparations for his eastern campaign; but his departure was delayed by domestic events, and in the spring of 336 he was assassinated, after sending forward a body of troops. Alexander, then 20 years old, immediately succeeded to the throne, and announced his intention to follow in his father's footsteps; but the occasion of Philip's death was seized by the Greeks for an attempt to throw off the Macedonian supremacy. Alexander's vigor and rapidity of action disconcerted the movement. He advanced rapidly toward Thebes, and the Athenians despatched envoys to deprecate his anger. A general congress was assembled at Corinth, and Alexander was appointed to his father's place as commander-in-chief of the expedition against Persia. Returning to Macedonia, with the intention of commencing his march to the East, he was prevented from carrying his plans into immediate execution by the disturbed state of the Thracians and Triballians. He marched against them, and quickly reduced them to obedience; but his absence in the north tempted the Greeks, especially the Athenians and the Thebans, into another insurrection. Alexander suddenly appeared in the neighborhood of Thebes, defeated the insurgents, took the city, sold the inhabitants into slavery, and levelled the houses, except that of Pindar, preserving only the Cadmea for a Macedonian garrison. He demanded that the ten leading orators of Athens should be surrendered to him, and was only induced to desist from this requirement by the intercession of Phocion. Having settled the affairs of Greece, and leaving Antipater as regent, in the spring of 334 he set out on his march for the Hellespont. (See ALEXANDER THE GREAT.) In the distribution of Alexander's vast dominions among his generals on his death (323), Antipater and Craterus were to share the government of Macedonia and Greece, in the name of his half-brother Philip Arrhidæus and of the child of Roxana, should that be a son, as associated kings, while Perdicas and Leonnatus were to act as regents in the East; arrangements which were of short duration, and were followed by numerous other partitions of power and provinces. During Alexander's absence from Greece attempts had been made to throw off the Macedonian yoke. The Spartans took up arms, but were defeated near Megalopolis by Antipater (331). In 325 Harpalus arrived in Athens with treasures he had stolen from Alexander; but though he attempted to bribe the leading politicians, he did not secure the protection of the state as he had expected. The news of Alexander's death made a great change, and the party opposed to Macedon in Athens immediately rose to the supremacy. An extensive confederacy was formed, an army was assembled near Thermopylæ under the command of Leosthenes, and Antipater, who had thrown himself into Lamia near the Malian gulf, was closely besieged. He was reduced to such straits that he sent an embassy

to Athens to sue for peace; but the Athenians refused to listen to any terms short of unconditional surrender. Leonnatus had come from Hellespontine Phrygia with an army of 20,000 foot and 2,500 horse. Antipater, who had succeeded to the command of the allied army after the death of Leosthenes at Lamia, met him in Thessaly, defeated his army, and slew the leader. Antipater soon after joined the defeated army, and, being reinforced by Craterus with a considerable force from Asia, defeated the allied army near Crannon (322). The allies now sued for peace; but Antipater would only treat with the separate states, and all except Athens speedily laid down their arms. As Antipater marched upon Athens, Phocion was sent in the hope of securing favorable terms. Antipater required that a certain number of the orators, including Demosthenes and Hyperides, should be surrendered, that a property qualification should be required for the franchise, and that a Macedonian garrison should be received into Munychia. On the motion of Demades, the Athenians condemned the orators to death; but they escaped from Athens before the arrival of the Macedonians. They were torn from the sanctuaries in which they had taken refuge by Archias, an officer of Antipater. Demosthenes put an end to his life by taking poison in the temple of Neptune, on the island of Calauræa; Hyperides was barbarously put to death at Athens. In the East, quarrels broke out between Perdicas, who had become the principal regent, and the other generals of Alexander, who assailed him on all sides. In 321 he marched against Egypt, and was there assassinated by some of his own officers. Antipater was now declared regent, with the government of Macedonia and Greece. He died in 319, and was succeeded by Polysperchon as regent, who proclaimed the independence of the Grecian states, and despatched his son Alexander with orders to compel the Macedonian garrison to evacuate Munychia. Phocion took refuge with him, but was sent back in chains to Athens, where in 317 he was put to death with every circumstance of outrage and indignity. Polysperchon being unsuccessful in an expedition in the Peloponnesus, the Athenians joined the alliance of Cassander, Antipater's son, who established an oligarchy at Athens under the government of Demetrius Phalereus. He became master of Macedonia, and in 315 restored Thebes, which had been in ruins since its destruction by Alexander. In the same year a war broke out in the East, but in 311 a peace was concluded, which was violated the next year by Ptolemy, governor of Egypt. In 307 Antigonus, who then held almost all Asia Minor and Syria, sent his son Demetrius, afterward called Poliorcetes (besieger of cities), to Athens with a powerful fleet. Demetrius Phalereus was forced to surrender, and returned to Thebes. The ancient constitution was restored, and Demetrius and his father

were honored by the addition of two new tribes, the Demetrias and Antigonias. In 306 Demetrius, being called away from Athens, gained a great victory over Ptolemy at Salamis in Cyprus. Antigonus in Asia Minor, Seleucus in Babylonia, Ptolemy in Egypt, and Lysimachus in Thrace now assumed the title of king. Demetrius Poliorcetes again returned to Greece, while Cassander was besieging Athens. Cassander retired, and Demetrius was again received with honors. The struggle between Antigonus and his rivals was brought to a close by the battle of Ipsus in Phrygia (301), in which Antigonus was defeated and slain; after this the Athenians refused to receive Demetrius. Cassander became master of Greece; Seleucus and Lysimachus divided the kingdom of Antigonus, the former receiving the lion's share, part of Asia Minor and the whole of Syria. In 300 Demetrius ravaged the Thracian Chersonesus, and formed an alliance with Seleucus, marrying his daughter, and then made another attack upon Athens, driving out the tyrant Lachares. Soon afterward Demetrius conquered Macedonia, distracted by the rival pretensions of the sons of Cassander. He attempted to recover the Asiatic provinces of his father; but Macedonia was invaded by Pyrrhus, king of Epirus, and Lysimachus, and Demetrius was obliged to fly. He died in Syria in 283. The further wars between the successors of Alexander hardly belong to the history of Greece.—In the midst of the Macedonian domination an important movement took place in Achaia, a narrow strip of country on the northern coast of the Peloponnesus. A league, chiefly for religious purposes, had existed from ancient times among the cities of this region, and though it had been suppressed by the Macedonians, Aratus of Sicyon revived it in 251, with a political organization under a chief entitled the strategus, or general, a secretary, and a council of ten demiurgi, the sovereignty residing in a general assembly composed of citizens who had reached the age of 30, which met twice a year at Ægium. The confederacy rapidly increased in extent and power, but in 227 was involved in a war with Sparta. Aratus was then strategus. He invited assistance from Macedon, then ruled by Antigonus Doson. In 223 he compelled the Spartan king Cleomenes to withdraw to Laconia. In 221 Cleomenes was defeated by Antigonus in the battle of Sellasia. The Ætolians, who had long been united in a league of tribes, made incursions into the Peloponnesus, and coming into collision with the Achæans under Aratus, near Caphyæ, the latter were defeated. This led to an alliance between the Achæans and Philip, the young king of Macedon, in 220. After gaining several victories, he made a peace with the Ætolians in 217. The war between Rome and Carthage now attracted the attention of the Macedonian king, who in 216 concluded a treaty with Hannibal, and went so far as to meditate an invasion of Italy. While laying siege to Apol-

onia he was attacked by the Roman consul, M. Valerius Lævinus, and compelled to retire. Having differences with Aratus with respect to some of his proceedings in Greece, he caused him to be taken off by poison in 213. In 211 the Romans made an alliance with the Ætolians, and declared war against Philip. They took several islands, which they surrendered to the Ætolians in the course of the year. In 209 the Achæans again solicited the aid of Philip. They were at this time led by Philopœmen, the "last of the Greeks," and in 208 he was elected strategus of the league. In 207 he defeated the Lacedæmonians at Mantinea; and as the Romans, having made peace with Philip in 205, retired from Greece, the country was left in a state of tranquillity for several years. In 200 they declared war against him, and a Roman fleet relieved Athens, which he was besieging; but in retiring he committed great ravages in the suburbs of the city. In 198 the Achæan league joined the Roman alliance, under the influence of the consul T. Quintus Flamininus. In 197 Philip was defeated in the battle of Cynoscephalæ, and peace was made in the following year, the Macedonians being compelled to renounce their supremacy, and to pay 1,000 talents for the expenses of the war. The Greeks assembled at the Isthmian games received the announcement of their new liberty with shouts of joy; but their dissensions continued, and soon broke out in fresh conflicts. The Ætolians having persuaded Antiochus the Great of Syria to come with an army into Greece, he was defeated at Thermopylæ in 191, and the Ætolians were obliged to ask for peace, and to submit to the most humiliating conditions. Philopœmen in the mean time had joined Sparta to the Achæan league; but that city proving intractable, he marched upon it, razed the walls, and compelled the citizens to adopt a democratic constitution. In 183 Philopœmen was taken prisoner by the Messenians, who had revolted from the league, and put to death. In 179 Philip died, and was succeeded by Perseus, who found large preparations made for a renewal of the war with the Romans. In 171 the Romans declared war against him, and the consul L. Æmilius Paulus was sent to Macedonia in 168. The war was ended by the battle of Pydna and the surrender of Perseus, who was carried to Rome to adorn the triumph of his captor. Commissioners were sent from Rome to arrange the affairs of Macedonia; but it was a quarrel between Athens and Oropus which finally gave the Romans an opportunity to bring all Greece into subjection, by destroying the Achæan league. The Oropians complained to the Roman senate; the Romans appointed the Sicyonians arbitrators, and they having condemned the Athenians to pay a fine of 500 talents, the latter sent an embassy of three philosophers, Diogenes the Stoic, Critolaus the Peripatetic, and Carneades the Academic, who succeeded in reducing the fine to 100 talents. Still fresh aggressions occurring,

the Oropians appealed to the Achæan league, which, at first declining to interfere, was finally involved by the intrigues of several leading men, among whom was Diæus the strategus, in a quarrel with Sparta. The latter appealed to Rome, and in 147 two commissioners were sent to Greece, who decided that Sparta, Corinth, and the other cities except those of Achaia, should be independent. This decision led to acts of violence; and finally Metellus, marching into Greece, defeated Critolaus the strategus in Locris. Diæus succeeded him; but another Roman force under Mummus landed on the isthmus of Corinth and defeated him in a battle fought near the city. Corinth was taken in 146; the city was burned; the works of art with which it was filled were transported to Rome; ten commissioners were despatched to settle the condition of Greece, and the whole country became a Roman province under the name of Achaia.—The Romans at first used their power with such moderation as to excite the admiration of Polybius, who was one of the 1,000 Achæans sent to Italy. The religion and the municipal institutions of the Greeks were treated with respect. Their eminence in literature and the arts qualified them to be the teachers of the Romans, who sent their youth to Athens to complete their education under the instruction of the scholars and philosophers of this city, which long retained its preëminence. It was not until the Mithridatic war that the Greeks made an attempt to throw off the Roman power. The losses sustained by Greece in this unhappy period were never repaired. The Cilician pirates soon after ravaged Greece; they were destroyed by Pompey. The civil wars that overturned the Roman republic desolated Greece; but the empire at length established peace throughout the civilized world. Greece continued to be the school of letters and art. She was still crowded with temples and statues, the products of the best ages. Her schools of philosophy and rhetoric flourished; the forms of public life were maintained, and but little change was made in the municipal administrations. But the dignity and influence of official position gradually sunk in the public estimation under a foreign supremacy. Augustus established military colonies. His successors generally treated Greece with respect, and some of them distinguished her by splendid imperial favors. Trajan even greatly improved her condition by his wise and liberal administration. Hadrian and the Antonines venerated her for her past achievements, and showed their good will by the care they extended to her works of art, and their patronage of the schools. About the middle of the 3d century A. D. hordes of Goths appeared on the frontiers, and soon after covered the Hellespont and the Ægean. Athens was gallantly defended by Dexippus the historian. Among the influences that essentially modified the condition, intellectual and moral, of the people of Greece, was that of Christianity, which

was introduced by the apostles themselves, and, from the time of St. Paul's discourse on the Areopagus, had been gaining upon the ancient paganism. The *ecclesia* became the church, and the *liturgia* passed over from the public political offices of the Athenian state to the Christian service. In 330 the seat of the Roman empire was removed to Constantinople, an event which brought Greece into closer relations with the Roman administration, though the local governments were still allowed to exist. The emperor Julian attempted to check the growth of Christianity, and to restore the ancient rites, but with little success. In 395 the separation of the eastern and western empires took place; and as the Greeks naturally belonged to the eastern, they now exercised a more powerful influence on the government. About this time the name Hellenes began to be limited to the adherents of the ancient religion. In the reign of Justinian (527-565) the philosophical schools of the Greeks in which doctrines adverse to Christianity were taught were closed; but much was done for the protection of Greece from foreign invasion. The western empire fell in 476; but the eastern Roman empire continued, becoming more and more properly Byzantine. (See BYZANTINE EMPIRE.) During this period the events which exercised the most important influence upon the condition of Greece were the immigrations of the Slavs and other races, commencing early in the 6th century. In the early part of the 8th century they occupied a large part of the country, and held possession of the coasts, displacing to a considerable extent the Greek population. But in the course of time they retreated, and the country was mainly restored to the descendants of its ancient inhabitants. Yet to this day the effects of these Slavic settlements are witnessed in the physical character of the people in some districts, especially of the Peloponnesus. Numerous traces of them are detected in Slavic names of persons and places, and in Slavic words still found in the language of the common people. But the theory advanced by the German Fallmerayer, that the Greek people wholly disappeared from Greece, and that the present inhabitants are Slavs, will not stand investigation. No important change occurred from this time until the conquests by the Normans. Robert Guiscard landed in Corfu in 1081. Bohemond invaded Illyria soon after. In 1146 Roger, king of Sicily, mastered Corfu, and, marching through the mainland, plundered Corinth, Thebes, and Athens. In the fourth crusade, commencing in 1203, Constantinople was taken by the Latin princes, who also divided Greece among them. The marquis of Montferrat became sovereign of Salonica (Thessalonica); Achaia and the Morea (Peloponnesus) became a principality under Guillaume de Champlitte and Geoffroi Villehardouin; a dukedom was established in the archipelago with Naxos as its seat; but the most remarkable of

these Frankish establishments was the dukedom of Athens, existing from 1205 to 1456. All these Frankish governments were swept away by the Turks, who, having captured Constantinople in 1453, in a few years thereafter extended their conquests over Greece, and incorporated it into the Turkish empire. It was organized into pashalics, mussemlics, agalics, and vaivalics, all subject to a supreme magistrate called *Rumeli valesi*, or grand judge of Roumelia. Some of the more mountainous regions were never thoroughly subject to the Turks, but maintained a rude independence. Under the Turkish system of administration the country sunk gradually to a most miserable condition. The Greek islands, being left more to themselves, suffered less from the rapacity and barbarism of their masters. But there were several causes which tended to preserve the Greek nationality even under this foreign and most oppressive domination. The domestic institutions and the religion of the Turks were objects of such abhorrence to the Christian Greeks that no amalgamation of the two races could take place. The Greeks cherished an inextinguishable devotion to their church, the foundation of which they traced directly to the times of the apostles, while the hymns and liturgies were the work of the most eminent Christian fathers. In this state of mutual repulsion, and of barbarous oppression of the superior by the inferior race, nearly four centuries passed away, with only a few spasmodic efforts to break the yoke of the tyrant. But the Turkish sultans, almost from the beginning of their establishment at Constantinople, were obliged to employ Greeks, chiefly Fanariotes, in several important branches of the public service. (See FANARIOTES.) Greek mercantile houses were established not only in the Levant, but in the principal cities of Europe, and the eminent abilities of the race were shown by their great success in every department of commerce. In western Europe, a revival of the taste for Greek literature was brought about by the presence of learned Greeks who fled from Constantinople at the time of its capture. In the last half of the 18th century the spirit of nationality and the desire of independence received a strong impulse throughout the Hellenic race. Education was everywhere promoted; a secret society was formed, called the *Heteria*, the object of which was the emancipation of the country. Eminent writers—Rhigas, and later Coray—appealed to the glorious recollections of Greece, and excited a universal enthusiasm for freedom. These preparations continued in the first quarter of the 19th century; and the insurrection, long looked for, broke out in 1821. The attempt of the Heterists under Alexander Ypsilanti in the Danubian principalities met with a speedy and disastrous end (June); the Suliotes of Epirus, encouraged by Ali Pasha of Janina, rose in vain; and the attempted risings in Candia (1821) and Scio (1822) were stifled in

the blood of the inhabitants. But the revolt which broke out in the Peloponnesus early in the first year was more successful; Patras, Tripolitza, and other places were taken; central Greece joined the movement; Hydra, Ipsara, Spezzia, and other islands of the archipelago furnished daring mariners; and the struggling people found heroic chiefs in Bozzaris, the Mainote bey Mavromichalis and his sons, Canaris, Miaulis, Colocotronis, Odysseus, and others, and statesmen in Mavrocordatos, Colettis, Negris. In 1822 a provisional constitution was framed by a national assembly held at Epidaurus, and a proclamation of independence solemnly published to the world. The contest was carried on in the most barbarous manner by the Turks. The bloodshed at Constantinople, the execution of the patriarch, the massacres of Scio, excited for the Greeks the deepest sympathies, procuring for them the aid of enthusiastic Philhellenes, Byron among others. On the other hand, the Greeks here and there imitated the atrocities of their oppressors. At Missolonghi (1822-'6) and numerous other places they showed themselves worthy of their Hellenic ancestors. The battle of Navarino, Oct. 20, 1827, in which the combined squadrons of England, France, and Russia annihilated the Turco-Egyptian fleet, was the decisive event; in the following year Ibrahim Pasha was forced by Marshal Maison to evacuate the Peloponnesus, and Russia began its Turkish war under the command of Diebitsch. The sultan was compelled to come to terms. Count Capo d'Istria, a distinguished Greek statesman, then in the service of Russia, had been chosen president, arriving in Greece in the beginning of 1828. Hostilities virtually ceased the following year. The great powers now occupied themselves with the settlement of Greece. They selected Prince Leopold, afterward king of Belgium, as sovereign of the emancipated state; he at first accepted the offer, but, owing to a difference on the question of boundaries, renounced the unoccupied throne a few months afterward. In October, 1831, President Capo d'Istria was assassinated at Nauplia, and six months of anarchy followed. The great powers then fixed upon Otho, the second son of the king of Bavaria, a prince then (1832) only 17 years old. He assumed the government, under the direction of a regency, and arrived at Nauplia in 1833. The boundaries of the kingdom of Greece were determined by a treaty between the great powers and the Porte in 1832. The seat of government was first established at Nauplia; but in 1835 it was transferred to Athens, where the king, after his marriage with the princess Amalia of Oldenburg, established his court. After attaining his majority in 1835 he governed in his own name, by ministers responsible to himself, aided by a council of state. The treaty said nothing about a constitution, though the Greeks expected one, and were disappointed not to receive it immediately. The government of the

king was despotic in principle, but mild and equitable so far as depended on himself. Ten years after Otho's accession the popular dissatisfaction reached its height, and the palace was surrounded on the night of Sept. 14, 1843, by the army and the people, demanding a constitution. After some hesitation the king yielded, and a political revolution was effected without violence. A national assembly was convoked, and a constitution, the result of its labors, was laid before the king on March 4, 1844. It received his sanction on the 16th. During the ten years following its adoption, Greek politics were in a state of almost constant confusion, in which partisan contests were fostered by foreign intrigues. The history of the first decade of constitutional government in Greece is a record of little more than party struggles for supremacy, turbulent elections, ministerial changes, and insurrections, which in one or two instances attained formidable proportions. The chief feature of this period of political disturbance was the constant struggle for power between the national party and the various foreign elements, which in the peculiar position of Greece were able to control its government in a very great degree. There were frequent changes of ministry, and the material interests of the country suffered. In 1847 a diplomatic difficulty, arising from an alleged discourtesy of the Turkish ambassador at Athens, threatened to involve the government in a war with Turkey. In the next year a series of grave differences with England, arising out of demands made by her upon Greece for damages sustained by British subjects under various circumstances, threatened a far more disastrous result. The complications arising from these claims, and especially from the claim of a certain Pacifico, a Jew who was a British subject, continued for several years to disturb the relations between the two countries. In January, 1850, they had assumed so threatening an aspect that a British fleet appeared off the Piræus, and, the demands of the English ambassador not being complied with, proceeded to blockade Athens and to make many arbitrary seizures of Greek shipping. The mediation of the French was sought, but England refused it; and Greece was compelled to yield to her demands in order to avoid an actual war. In 1852 the failure of the grape crop produced much suffering among the people. In 1853 a severe earthquake caused serious loss of life and property in many parts of the kingdom. Banditti infested the Peloponnesus and central Greece, and several popular disturbances took place. At the outbreak of the Crimean war Greece took a decided stand in favor of Russia; but the threats of England and France compelled the government to pledge itself to neutrality, and Piræus was guarded by English and French fleets, which were not removed till 1857, after many protests of the Greek government. In 1859-'61 the question of the annexation of the Ionian islands, which had

long been under the protectorate of Great Britain, was the most important and exciting feature of Greek politics. The opposition manifested by the people of the islands to English rule had for several years been manifested by popular demonstrations and even insurrections; and, in the already excited state of public feeling against England, these received the encouragement and sympathy of the Greeks. But the powerlessness of Greece was too manifest to permit her undertaking a war; and the matter ended, after long diplomatic negotiation, in the continuance of the former relations. In the mean time the general hostility felt toward the German king and the royal family had increased to such a degree that open demonstrations were made against them when they appeared in public. Dossios, a student who attempted to assassinate the queen in September, 1861, was openly defended by many of the people; and threats were everywhere uttered against King Otho. An attempt at conciliation made by him in January, 1862, when he promised the adoption of a series of liberal measures, failed through his unwillingness to go as far as the popular voice demanded. After several minor insurrections elsewhere, a revolution broke out in Athens on Oct. 22, 1862. It was speedily successful through the apathy of the army in the royal cause; and on the 23d a provisional government was established by the leaders of the popular party. They immediately decreed the deposition of King Otho, and the calling of a national assembly. The king, who was absent on a voyage to the ports of the Peloponnesus, received the news of what had occurred as he reached the Piræus on his return. Without landing, he held a council with the diplomatic representatives in Athens on board his ship, and in accordance with their advice he issued a proclamation on the 24th taking leave of Greece, but without making a formal abdication; and shortly after he returned in an English frigate to Germany. On Dec. 1 a decree was issued by the provisional committee ordering the election of a new king by universal suffrage. Several candidates for the throne had been brought forward by the great powers, Prince Alfred of England and the duke of Leuchtenberg being among the chief. At the first ballot Prince Alfred was elected by an immense majority, but he was afterward withdrawn by England on account of an existing agreement that no prince of either of the three special protecting powers of Greece (France, England, and Russia) should accept the throne. At the same time England expressed, in effect, its willingness, provided a king should be elected to whom the English government could not object, to abandon its protectorate over the Ionian islands, and to give them up to Greece. The national assembly called by the provisional government met at Athens on Dec. 22, and confirmed the deposition of the Bavarian dynasty (Feb. 16, 1863). On March 30 Prince

George of Denmark was unanimously elected by the assembly, and the election was confirmed by the great powers on July 13. Considerable disturbance had meanwhile existed throughout the country; but when King George landed at the Piræus in October he found the kingdom in a condition of at least outward quiet. On Oct. 31 he took the oath to support the constitution; and soon afterward the Ionian islands were formally annexed to his dominions (treaty of Nov. 14, 1863). Greek politics continued to be marked by dissension and partisan intrigue, involving constant ministerial changes and detriment to the general welfare. In 1866 the Cretan revolution threatened to involve Greece in a conflict with Turkey on account of the assistance furnished to the Cretans by blockade runners and of the asylum given to fugitives, more than 30,000 of whom, chiefly women and children, took refuge in Greece. (See **CANDIA**.) The danger was finally averted, but the finances of Greece, owing to the defensive measures during the threatening period, were left in an embarrassed condition, and financial schemes have since formed the chief feature of Greek politics. Outside of partisan struggles, only one event has in the last five years excited attention in other countries. This was the massacre by brigands of four members of a party of English travellers, who in 1870 were captured near the plain of Marathon and carried into the mountains, while a messenger was sent to Athens to offer, on the part of the banditti, the alternative of a large ransom and amnesty for themselves, or the death of all the prisoners in their hands. The Greek government would not consent to treat with the robbers, as even the king himself does not possess that power under the constitution; and though every effort was made to rescue the Englishmen, they were put to death. The affair was mismanaged through the interference of the British ambassador, who had attempted to treat directly with the brigands, offering them money and a frigate to take them to Malta; but they rejected these offers and insisted upon amnesty. England held the Greek government responsible for the massacre, on the ground that it was bound to suppress organized brigandage in its territory, and the matter threatened to lead to hostilities. But the danger was averted by negotiation and the payment of £10,000 by the Greek government to the family of Lloyd, one of the murdered travellers, and the subject was gradually suffered to drop.—The new kingdom on its establishment embraced, of the country constituting ancient Greece, the southernmost districts of Thessaly, central Greece, and the Peloponnesus. Of the islands, the Cyclades (with the exception of one), Eubœa, and a few of the Sporades (in the wider signification) were embodied in the new kingdom; the Ionian islands remained under the protectorate of Great Britain till 1863,

when they were ceded by treaty to Greece; all the other islands remained with Turkey, and the repeated insurrections, particularly in Candia, were without result. After the incorporation of the Ionian islands, the area of the kingdom of Greece amounted to 19,353 sq. m. It is now divided into 13 nomarchies, as follows, the former Ionian islands being embraced in the three last named, with the exception of Cerigo and the adjacent islets, which have been united with the nomarchy of Argolis and Corinth:

NOMARCHIES, &C.	Square miles.	Population in 1870.
Attica and Boœtia	2,481	136,804
Eubœa	1,574	82,541
Phthiotis and Phocis	2,063	108,421
Acarnania and Ætolia	8,025	121,693
Achaia and Ellis	1,908	149,561
Arcadia	2,023	131,740
Laconia	1,673	105,851
Messenia	1,226	130,417
Argolis and Corinthia	1,443	127,820
Cyclades	926	123,299
Coreyra (Corfu)	427	96,940
Cephalenia (Cephalonia)	802	77,882
Zacynthus (Zante)	277	44,557
Soldiers of army and navy .....	...	18,785
Sailors, not present in the country .....	...	7,183
Total	19,853	1,457,894

—In the mountains but little vegetation besides alpine plants grows at a height greater than 5,500 ft.; but below this line the hillsides are clothed with luxuriant forests, principally of pine and oak. Lower down the walnut and chestnut abound; and below a height of 1,500 ft. is found as great a variety of valuable trees, shrubs, and plants as is afforded by any other part of the world. All the fruits belonging to the latitude grow vigorously and produce abundantly, and if cultivated with proper skill and care would afford a valuable surplus for export. Although the soil of Greece is good, agriculture has been greatly neglected. More than half the area is productive soil, of which 20 per cent. is arable land, 1 per cent. garden land, 4 per cent. vine land, 41 per cent. meadow and pasture, and 34 per cent. wood land. The most important products are olives and currants; the latter are chiefly cultivated on the coast of the Peloponnesus and on the islands of Corfu, Zante, and Cephalonia, which from 1866 to 1870 yielded an annual average product of 170,000,000 lbs., the larger portion of which was exported to England. Wine culture yields annually about 18,000,000 gallons. Among the other products are tobacco, cotton, figs, lemons, and valonia. Breeding of sheep, goats, and silkworms is also carried on to a considerable extent; several places on the coast have extensive fisheries. The culture of forests is greatly neglected, although the country has a peculiar kind of oak which is important for commerce. The number of horses is estimated at 100,000; of mules and asses likewise at 100,000; and in 1867 there were 109,904 cattle, 2,539,538 sheep, 2,415,143 goats, and 55,776 swine. The

English Miles

The names in capitals are those of the Eparchies. These form 13 larger divisions called Nomarchies, the boundaries of which are shown by red lines.



most important mineral products are the marble of Paros and the emery of Naxos, the latter a government monopoly. The famous Laurian lead mines in Attica, recently reopened by a Franco-Italian company, promised so large a yield as to lead to a conflict between the government and the company, but the difficulty was settled by the purchase of the foreign interest by a Greek company. The sea-salt works yield annually about 253,000 cwt. of salt.—The commerce of Greece is considerable, owing to the favorable situation of the country. The imports and exports from 1869 to 1871 were as follows:

YEARS.	Imports.	Exports.
1869	\$18,215,000	\$12,073,000
1870	18,725,000	10,211,000
1871	20,947,000	14,643,000

The most important articles of import were: breadstuffs, \$4,940,000; manufactures, \$3,570,000; skins, \$1,669,000; sugar, \$1,961,000; lumber, \$808,000; animals, \$530,000; cotton yarn, \$453,000; coffee, \$351,000; rice, \$324,000. The most important exports were: currants, \$5,851,000; skins, \$526,000; olive oil, \$2,063,000; raw cotton, \$221,000; figs, \$700,000; oranges, \$106,150; tobacco, \$137,030; wine, \$152,000; silk cocoons and raw silk, \$252,000; soap, \$89,000; lead, \$689,000. The merchant navy at the end of 1871 numbered 6,135 vessels, with an aggregate of 419,350 tons; among which were more than 4,000 coasting vessels, and 12 steamers, with an aggregate of about 5,360 tons. The movement of shipping in 1870 and 1871 is shown by the following table:

ENTRANCES AND CLEARANCES.	Years.	Vessels.	Tons.
Sea-going vessels	1870	16,757	2,564,964
Coasting vessels	"	94,991	2,985,520
Sea-going vessels	1871	21,768	3,205,619
Coasting vessels	"	103,612	3,960,790

The manufactures are few and unimportant. The prominent branches of industry are ship building, the manufacture of leather (chiefly on the island of Syra), silk and linen goods, sails and cordage, soap, liquors, and gold and silver embroideries. The first railway of Greece, connecting Athens with Piræus and Phalerum, and having a length of $7\frac{1}{2}$ m., was opened in January, 1869. A road connecting the port of Piræus with Lamia, which will be 138 m. long, was begun in December, 1872; and a charter had been given for building a road from Athens to Kalamata, to be 170 m. long. In 1870 there were 992 m. of electro-magnetic telegraph, with an aggregate length of wires of 1,116 m. Submarine cables are in operation between Athens, Syra, Scio, Constantinople, and Candia. The number of post offices in 1870 was 135. The monetary unit is the new drachma, which is equal to 19·3 cents;

it is divided into 100 leptas. The standard of weight is a cantar, equal to 124·13 lbs. avoirdupois; it is divided into 44 oke, and subdivided into 400 old or 1,280 royal drams. The unit of long measure is the royal pit, equal to 1 metre or 3·2808 feet. Land is measured by the stadion, which is equal to 0·62 of an English mile.—The constitution under which Greece is now governed bears date Nov. 17, old style (Nov. 29, new style), 1864. The throne is hereditary. The king attains his majority when 18 years old. Before his accession to the throne he must take the oath to the constitution, and within two months after the accession he must convoke the legislature. The successors to the present king, who is a Lutheran, must belong to the Orthodox church. The legislative power is shared by the king with a single chamber of representatives, called the *boule*, which is elected every fourth year; in the session of 1871-'2 it consisted of 188 members. It meets annually on Nov. 1 (old style), and remains in session not less than three and not more than six months. It elects its own president and vice presidents. State officers, mayors, and military officers in active service, are not eligible; clergymen can neither be elected nor vote. The elections are by ballot with the use of balls, and each candidate must be put in nomination by the requisition of at least one thirtieth of the voters of an electoral district. The right of voting belongs to all citizens who are 21 years of age and have a property, a trade, or any fixed occupation. To be eligible as deputy, it is necessary to be 30 years of age and to own real estate. All citizens have equal rights and duties; nobility has been abolished. The executive power is exercised by the king through responsible ministers, of whom there are seven: of the interior, of finance, of justice, of education and ecclesiastical affairs, of war, of marine, and of foreign affairs. For administrative purposes, the 13 nomarchies are subdivided into 59 eparchies and 351 demoi (communes). At the head of these divisions are nomarchs, eparchs, and demarchs; the latter are, like the communal councils, elected for a term of four years. There is a court of cassation (the *areopagus*) at Athens, four courts of appeal (at Athens, Nauplia, Patras, and Corfu), 16 courts of primary jurisdiction, the court of assizes, 175 tribunals of justices of the peace, and a number of military and marine courts. The finances of the kingdom are in a very unfavorable condition. In the budget estimates the revenue generally shows a small surplus over the expenditures; thus in the estimates for 1873 the revenue was estimated at \$6,928,000, and the expenditures at only \$6,832,000; but in reality the expenditures since 1866 have exceeded the revenue by about \$2,700,000 annually. Official returns giving the real income and expenses of the government have not been published since 1859. The funded debt amounted in July, 1870, to \$65,000,000 (in-

cluding the interest on the loans contracted in 1824 and 1825, which has not been paid, the former since July, 1826, the latter since January, 1827). The floating debt, according to semi-official returns, amounted in January, 1870, to \$6,900,000, but there is also an unrecognized debt of several millions. By the new law of recruitment of 1867, the liability to military service is universal. The armed forces consist of the army and the national guard. The duty of serving in the army begins with the 20th year, and lasts 12 years (three years in the line, three in the first, and six in the second reserve). If necessary, all Greeks capable of bearing arms, up to the age of 40, can be enlisted in the army. In the national guard, which is to be employed for the defence of the country in time of war, all citizens must serve from the 18th to the 50th year of age. The strength of the army in 1871



Modern Greek Costume.

was 12,400 men on a peace footing, and about 48,000 men in time of war, including the volunteers; the national guard numbers about 90,000 men; and the total strength of the army on a war footing would therefore be about 138,000 men. The navy at the close of 1871 consisted of 2 iron frigates, 8 screw steamers, and 11 sailing vessels, with an aggregate of 200 guns and 2,500 men. The navy is manned by conscription from the inhabitants of the seacoast; but volunteering is greatly encouraged by the government.—In the population of Greece but a small foreign element is mingled. The number of those not speaking the Greek as their native tongue amounted in 1870 to only 67,941, of whom 37,598 were Albanese (Arnauts), 1,217 Macedo-Wallachs, and 29,126 others. The immense majority of the population are connected

with the Orthodox (Greek) church; the number of other Christians, chiefly Roman Catholics, in 1870, was 12,585; of Jews, 2,582; of all others, 917. The affairs of the Orthodox church are under the direction of a permanent holy synod at Athens, consisting of five members appointed by the king from the archbishops and bishops, and presided over by the metropolitan of Athens. All their resolutions must be confirmed by the king. The Orthodox church has 15 archbishops, the first of whom is the archbishop of Athens, who has the title of metropolitan, and 16 bishops. The archbishops and bishops are presented for their office by the synod, and confirmed and appointed by the king. Exclusive of the Ionian islands, the church has about 3,200 secular priests, 1,600 monks, and 1,500 nuns. Formerly the number of convents was much greater, but in 1829 about 300 were closed and their estates appropriated for churches and schools. The Roman Catholic church has two archbishops (Naxos and Corfu) and four bishops. All religions are tolerated and have freedom of public worship. Instruction in Greece is compulsory for all children from 5 to 12 years; but the attendance at the primary schools is unsatisfactory, for in 1869 the 1,141 public and private primary schools numbered only 60,634 pupils, being 4.3 per cent. of the total population. The secondary instruction in 1870 embraced 15 gymnasias and 114 Hellenic schools (corresponding to the German *Realschulen*), with an aggregate attendance of 7,780 pupils; and 23 private institutions, with 1,589 pupils. The national university at Athens has four faculties, the theological, law, medical, and philosophical, and in 1869 was attended by 1,205 students. Of special schools, there are a polytechnic school at Athens, four theological schools of the Orthodox church, six nautical schools, one agricultural school, and one military academy at the Piræus.—For an account of Greek art, see ARCHITECTURE, PAINTING, and SCULPTURE. On the geography of Greece, see William Smith, "Dictionary of Greek and Roman Geography" (2 vols. 8vo, London and Boston, 1854-'7), and the works of Mannert, Leake, Rangabe, E. Curtius, Hettner, Blouet, W. G. Clark, Linton, Bayard Taylor, Wordsworth, Périgot, Joanne, and Mansolas. On ancient history and archaeology, see Grote, "A History of Greece" (12 vols. 8vo, London, 1846-'56; 12 vols. 12mo, New York); E. Curtius, *Griechische Geschichte* (1857-'67; English translation, London, 1868-'73); Cox, "History of Greece" (London, 1874); and besides the classical writers, the works of Goldsmith, Gillies, Thirlwall, Pococke, Gladstone, Heeren, Böckh, Manso, Droysen, Duncker, O. Müller, Hermann, Schömann, Wachsmuth, Kortüm, Mitford, Clinton, Mure, and Felton. On mediæval and modern Greece, see Brunet de Presle, *La Grèce romaine, byzantine, turque et régénérée* (Paris, 1860); Tuckerman, "The Greeks of To-day" (New York,

1873); and the works of Fallmerayer, Prokesch-Osten, Villemain, Pouqueville, Finlay, Keightley, Emerson Tennent, Rizos-Nerulos, Sutsos, Gervinus, Tricupis, and Zinkeisen.

GREECE, Language and Literature of. The Greek language is a branch of the Indo-European family, and was spoken, probably as early as 15 centuries before our era, by the Greeks in Europe and Asia Minor, and subsequently in lower Italy, Sicily, and numerous colonies established on the coasts of the Mediterranean and Black seas. It became afterward the reigning language of the Macedonian, Syrian, Egyptian, and Byzantine empires. Besides the dialects of modern Greece, remnants of it are found in lower Italy, at the southern extremity of Calabria. The origin of the language and the degree of its relationship to other forms of Aryan speech have not been definitely established. The ancient Greeks and Romans speak of a Pelasgic race as the common stock of both nations, but without furnishing sufficient information to place it within the reach of history. The conjectures of ancient and modern writers have linked it to nearly every great nation of antiquity, but without a satisfactory result. Alstedius in the 17th century derives the Greek from the Hebrew, and the people from Javan, the son of Japheth; Webb from the Chinese; Monbodo from Egypt, believing that the Pelasgi were Goths. Martin and Buffier assert that the Phœnician Cadmus altered the language in the north, and the Phrygian Pelops in the south. Rudbeck and Ihre derive it from the Gothic, while Jamieson holds to the reverse. Grote says that he cannot accept a hypothesis which implies that "the Hellenic language is a mere confluence of two foreign barbaric languages (Phœnician and Egyptian) with two or more internal barbaric languages, Pelasgian, Lelegian, &c.," and considers futile all inquiries in regard to the ante-Hellenic Pelasgians. George Rawlinson adopts the opinion of Niebuhr, Thirlwall, and K. O. Müller, that the relation of Greek to Pelasgian was like that of English to Anglo-Saxon. Gladstone designates the Pelasgians as pure Aryan, and the Hellenes "as Aryan with a residue or mixture of Turanian elements." Geldart considers the popular notion of the Greeks themselves, that the language of the modern Albanians is that of the ancient Pelasgians, as nearest the truth. Cuno contends, in his *Forschungen auf dem Gebiete der alten Völkerkunde* (Berlin, 1871), that the Greeks and Romans used the term Pelasgian very nearly in the same sense in which modern linguists use the term Aryan or Indo-European, and that Greek is most closely related to the Lithuanian language, because it has retained the same accentuation and several forms of words which, though found in Sanskrit, have disappeared in the other languages derived from it. The belief that Latin is a daughter of Greek, which was common for centuries both in ancient and

modern times, has been rejected by many eminent scholars. The general opinion at present is that Greek is an elder sister of Latin. E. Curtius says that out of 500 Greek verbal roots only 30 reappear exclusively in Latin. Lottner says he has discovered that Greek has fewer words in common with Latin than Latin has with German, Slavic, and Lettic. Max Müller makes the following statement in regard to the affinity of the classical tongues of the Indo-European family: "No sound scholar would ever think of deriving any Greek or Latin word from Sanskrit. . . . Sanskrit, Greek, and Latin are sisters, varieties of one and the same type. They all point to some earlier stage, when they were less different from each other than they now are, but no more."—The history of the Greek language is divided by Benfey, in his *Geschichte der Sprachwissenschaft* (Munich, 1868), into three periods. The first is the period of its literary development from the time of epic poetry to the rise of the common tongue, the *koivḗ* or the Hellenic of the Hellenes; the second embraces the time during which the *koivḗ* came to be the language of all civilized nations and educated persons, and the time during which it was gradually confined again to its original limits; the third period begins with the fall of the Byzantine empire, and its principal feature is the gradual disregard of the literary language, and the rise of the popular forms of speech which finally produced the modern Greek. History becomes acquainted with the Greek language only after it had separated into numerous dialects. The dialectic differences were mainly of form and pronunciation, and but small in stems and roots. Two main classes predominate among all the dialect forms: the Doric (*ῥ Δωρική* or *Δωρίς*) and the Ionic (*ῥ Ἰωνική* or *Ἰάς*), which were spoken by the two principal races, of which the Doric was the largest. Another principal dialect was that spoken by the Æolians of Asia Minor, Bœotia, and Thessaly. E. Curtius, in his "History of Greece" (translated, London, 1868-'73), says: "There were Greeks who spoke neither Ionic nor Doric, and these were said to speak Æolic. But the Æolic is not a dialect, like the Doric and Ionic; it commands no defined territory of language, and possesses no fixed character. The so-called Æolic Greek is rather to such an extent colored differently, according to the different regions in which it settled itself, that it is impossible to fix upon a universally prevalent type, upon a fixed law of sounds, and a system of grammatical forms comprehending all its members. Speaking generally, and leaving out of the question certain more recent formations, it included those forms which, when compared with the cognate languages of Asia, we must recognize as the most ancient. The Æolic stands nearest to the original tongue of the Greeks, to that tongue which we must regard as the common mother of the various dialects—among them, of the Græco-Italic language;

accordingly, it is easy to point out undeniable analogies between Æolic Greek and Latin." The Doric dialect was spoken chiefly in northern Greece, in the Peloponnesus, in Crete, and in the numerous Doric colonies, especially Sicily and lower Italy. It is essentially the dialect of Pindar and Theocritus. Ionic was spoken chiefly in Asia Minor and Attica, in numerous islands, and in the Ionic colonies. It was early developed by poetry, and produced three different but nearly related dialects: the old Ionic or epic dialect, preserved in the poems of Homer and Hesiod; the new Ionic, chiefly known from the history of Herodotus; and the Attic dialect, contained in the literature of Athens at the time of her glory. In the Attic dialect three less important distinctions are made, the old, the middle, and the new; or the two distinctions between the earlier and the later Attic. The old Attic differed but little from the old Ionic, as the Ionians were the original inhabitants of Attica; but through intercourse with Æolians, Dorians, and other Greek and foreign races, it adopted many non-Ionic words, and produced the middle or earlier Attic, as written by Thucydides and the tragedians. The new or later Attic is considered as beginning with Demosthenes and Æschines. Through the importance of Athens and the superiority of its literature, the Attic became the chief dialect, and, even after Athens had ceased to be the leading city, remained the language of the educated Greeks. But it soon lost its purity and excellence, and thus from the 3d century B. C. the common Greek dialect (*ἡ κοινὴ διάλεκτος*) was distinguished from it. The conquests of Alexander gave it an enormous territory; but being spoken by Macedonians, Egyptians, Ethiopians, Syrians, and other minor nations, it was stripped of many of its original forms, and numerous barbarisms were added to it. The researches of Curtius tend to show that the Greeks and Macedonians could not understand each other. How far the Macedonian language resembled that of the Illyrians is not positively known. It is apparent, however, that at this time took place a gradual mingling of Greek and Macedonian speech, as Plutarch asserts that Greek and not Macedonian was spoken at the courts of Philip and Alexander. The fusion of the two languages produced the so-called Macedonian dialects, of which the most prominent, being cultivated by learned men, was that of Alexandria. It has been falsely termed the Hellenistic language; with its Syrian, Hebrew, and Chaldean peculiarities, it was used in the Alexandrian translations of the Old Testament, and subsequently also of the New, whence it has been carried into the works of the fathers of the church; and it has therefore been proposed to designate it as ecclesiastic Greek. The Greek spoken in Egypt was mainly a language studied by officials and traders. The dialect has been found inscribed on the stones of Rosetta and of Adule, and on a num-

ber of papyri. The Greek of Ethiopia was still more corrupt, and was also principally used in business and for inscriptions. Greek was spoken in Carthage and Mauritania, as well as in Bactria and India. It continued also to be spoken in Gallia Narbonensis and Aquitania, where, starting with the colony of Massilia established by the Phœceans in the 6th century B. C., it had gradually gained territory and become the general language of the institutions of learning. Henry Stephens shows, in his *Traité de la conformité du langage françois avec le grec* (Paris, 1569), that it remained there in use for many centuries after the introduction of Christianity. In Sicily, and in parts of Calabria and Apulia, Greek was spoken as late as the 11th century of our era. Mommsen has shown, in his *Unteritalische Dialekte* (Leipsic, 1850), that it continued to be used by the side of Latin and Arabic, until Italian usurped its place as the literary language of the country. Greek was thus during the first three centuries of our era a sort of universal language, and everybody who claimed to be educated was obliged to be conversant with it. But the language deviated perceptibly from the old standard, and the efforts of the purists to check this tendency, by insisting on using ancient Attic forms, had but little success. The transfer of the seat of government of the Roman empire to Constantinople caused the introduction of many Latinisms, and the crusades that of many Gallicisms and other foreign elements. According to Hallam, artificial Attic Greek was spoken in Constantinople, even till its capture by Mohammed II., by the superior ranks of both sexes, with tolerable purity, and at that time had degenerated only among the common people and the inhabitants of the provinces. But the literary documents show a gradual transition from the language of the grammarians to that of the people, which is designated in them as the common and impure language, or the common and simple style, and also as usage. The popular dialect of the 12th century was essentially the same as the Romaic or modern Greek of the present day, and the first writer who can be said to have used it in its entirety was Theodorus Prodromus, nicknamed Ptochoprodromus, a monk who lived in the reign of the emperor Manuel Comnenus. The appellation of Romaic, by which the new dialect was designated, arose from the circumstance that the Greeks had affected the name of *Ῥωμαῖοι*, after the new name of the seat of government (*ῥῶμα*), and in distinction from the *Ἕλληνες*, who were the latest advocates of the language and customs of ancient Greece. But the modern theory of a complete extirpation of the Hellenic race at this present time is unsupported by the unalloyed speech of the inhabitants of modern Greece. Deffner and other students of modern Greek have shown that it contains formations evidently older than the Attic dialect, with which a large class of modern Greek

authors are now striving to supplant it. In fact, the so-called ancient forms never died out, but are nearly all found even in the more cultivated modern Greek of the middle ages. Greek is now, says Geldart, "as really alive as it was in the days of Homer." "Comparative philology derives no unimportant light from modern Greek, because it preserves many archaic forms which are postulated by philologists, but not actually to be found in any known dialect." Mullach, in his *Grammatik der griechischen Vulgärsprache* (Berlin, 1856), divides the existing dialects of modern Greece into six main varieties, besides Tzакonian and Albanian, whose claim to be considered Greek dialects is not admitted by all. They are: 1, the dialect of Anatolia (Asia Minor); 2, Chiotic; 3, Cretan; 4, Cyprian; 5, Peloponnesian; 6, of the Ionian islands. The Tzакonian dialect is the language of ancient Cynuria, and of a foreign race, which was probably of Semitic origin. It adopted and adapted the materials of the Greek language gradually, partly during the time that Greek was still ancient Greek, and partly after it had become modern. Albanian is considered by many authorities the direct descendant of ancient Pelagic or Græco-Italic, the parent of both Latin and Greek. The modern Greek dialects of lower Italy are not well known; they are spoken in 12 villages at the southern extremity of modern Calabria.—The Greek alphabet was formed from the Phœnician. Ancient writers supposed that it was at first composed of 16 letters only, obtained from Cadmus, and that the other letters were due to Palamedes and others. Many authorities consider these personages mythical; others, like Lenormant in *La légende de Cadmus* (Paris, 1867), consider them historical. Mommsen believes that an Æolic-Achaëic alphabet was in use in the Peloponnesus long before the dominion of the Dorians, who introduced their own graphic system; but his theory is hardly supported by palæographic material. Curtius's hypothesis is that the Asiatic Ionians obtained it from the Phœnicians, and carried it into European Greece about 14 centuries B. C., while Duncker argues that it was brought from Crete to Greece during the 8th century. Without regard to the period and manner in which the Greeks came into its possession, the prevailing opinion is that they adopted at once the whole Phœnician alphabet of 22 letters, and added the sign Υ . Some of the letters passed out of use, as the *vav* or digamma and the *koppa*, and were replaced by others, as the *phi* and *chi*, which appear already in the old Attic alphabet. The Ionians added the *psi* and the *omega*, and employed the aspirate *eta* to designate the sound of long E. Their alphabet, thus consisting of 24 letters, was officially adopted in Athens in 403 or 401 B. C., and has since continued in general use. The ancients believed that all words beginning with a vowel had some aspiration, either soft (*πνεῦμα ψιλον*, *spiritus lenis*)

or hard (*πνεῦμα δασύ*, *spiritus asper*). The *spiritus lenis* (') is not rendered in other tongues; the *spiritus asper* (') is given in Italic and Germanic languages by H. In diphthongs the breathing stands over the second vowel. The two breathings were distinguished only during the flourishing period of Greek, and only in Doric and Attic. After Alexander the Great it seems that the *spiritus asper* lost its force in the whole language. In modern Greek both breathings are written, but neither is pronounced. The signs - and ~ over a vowel to denote that it is long or short are used only with the vowels *a*, *ε*, *υ*, since *ε*, *η*, *ο*, *ω* are distinguished by their form. The sign (') for the *spiritus lenis* is also used as an apostrophe, and further as a *coronis* over the junction of two words contracted into one. The Greeks indicate also the tone or accent of words. The circumflex accent is placed only on the last syllable, or last but one, of a polysyllabic word; the acute equally on short and on long syllables; and the grave accent may be considered to rest on every syllable not otherwise marked, especially on the final syllable of polysyllabic words, but is written as a substitute for the acute on final syllables of words within a sentence and not immediately followed by a pause. Accentuation, however, is not uniform in all Greek dialects. It is supposed by many that Aristophanes of Byzantium was the inventor of the signs of aspiration and accentuation, and that they were introduced about 200 B. C. for the purpose of teaching the language to foreigners. They do not appear in very old inscriptions and manuscripts, but there is reason to think that they were used long before his time. The ancients wrote only in uncials and capitals or majuscules. A sort of cursive or business hand made its first appearance in Alexandria about the 2d century B. C.; but the small characters or minuscules are not found in manuscripts older than the 8th century A. D.—The pronunciation of Greek in the times of Homer, Sophocles, and Xenophon is still a matter of discussion. While it has gradually become quite uniform in continental Europe, the English allowed the continuance of the English vowel sounds, a practice which had its origin with the grammar schools and crept into the universities. Many prefer the system of pronunciation called *etacism*, which was introduced by Erasmus in the beginning of the 16th century. Until then it was allowable to read ancient Greek after the pronunciation of modern Greek as spoken by the natives who fled to the west of Europe. This pronunciation is called *iotacism*, or *Reuchlinism*, after Reuchlin, who was its advocate in the time of Erasmus. It consists in pronouncing *ι*, *η*, *υ*, *ει*, *αι*, *οι*, *υι* with the same sound, that of the Italian *i*; when accented, like the English *ee* in *bee*; when unaccented, like *i* in *bit*. Furthermore, *αι* is pronounced like the Italian *e*, *av* like *av* or *af*, *ευ* like *ev* or *ef*, *ηυ* like *iv* or *if*; the *iota subscript* has no effect on the pro-

nunciation of the vowel above it; β is pronounced like our v ; γ before e, i , &c., like y ; δ like the soft th or the soft Spanish d ; ζ like s ; χ as a strong aspirate, like x or j in Spanish; τ after ν sounds like d ; and π after μ like β . The Erasmians maintain that among the ancients each vowel and diphthong had its own proper sound: a like the Italian a , i like the Italian i , u like the French u or German $ü$, e and η like the Italian long and short e respectively, and diphthongs the sounds which result from the combined sounds of their component letters. They maintain also that β has the sound of our b , γ of our hard g , δ of d , ζ of dz , and χ of German ch ; that τ and π should always retain the sound of t and p ; and that the initial aspirate should be sounded as h . The controversy has been carried on with renewed energy in recent times, but so far to no definite settlement, the etacists and the iotacists being equally supported by high authorities.—Greek grammar has received a scientific method through the results of comparative philology, especially subsequent to the labors of Bopp and Pott, and through the recent researches of Curtius. The noun in ancient Greek has three numbers, singular, dual, and plural. The dual is a later formation, and did not occur in Æolic. The distinction of the three genders, though unknown to Indo-European in its radical stage, was introduced very early, probably before the first separation occurred. There were originally only the three cases, vocative, accusative, and nominative; the genitive and dative were introduced subsequently. The three modes of declension vary in the ancient dialects. Adjectives have either three or two endings, and in the latter case the masculine and feminine agree. Personal pronouns are declined in a peculiar manner; otherwise the declensions of nouns apply also to adjectives, and with variations to pronouns and numerals. Adjectives admit of comparison. Verbs are of three genera, possessing, besides the active and passive, a middle voice; most tenses of the passive and middle voices coincide; the middle has a kind of reflexive, reciprocal, or deponent character. The tenses are the present, imperfect, perfect, pluperfect, aorist, future, and future perfect; the moods are the indicative, subjunctive, optative, imperative, and infinitive. The preterite tenses are formed by augments and reduplication. There are active, reflexive, and passive participles, and verbal adjectives. The endings are inflected according to the character of the verbs, which terminate either in μ or in ω in the first person singular of the present indicative.—The language of the common people of modern Greece has a number of striking peculiarities. $\Delta\acute{o}\xi\alpha$ and words like it make in the genitive $\tau\eta\varsigma \delta\acute{o}\xi\alpha\varsigma$, in the plural $\eta \delta\acute{o}\xi\alpha\iota\varsigma$, accusative $\tau\alpha\iota\varsigma \delta\acute{o}\xi\alpha\iota\varsigma$. A large number of nouns belonging to different declensions are made to follow one. The ν for the accusative is dropped in pronunciation where the phonetic laws of the language admit of it. The

plural of many words, especially those of foreign origin, is formed by adding $\delta\epsilon\varsigma$ to the stem, as $\piασάδες$, from $\piασάς$, pashas. Many feminines whose root vowel is ω or ov take ϵ in the genitive singular, as $\tau\eta\varsigma \muαῖμῶ\epsilon\iota\varsigma$, from $\eta \muαῖμῶ\upsilon$, monkey. Metaplastic nouns or secondary formations are common, as $\delta \piατέρας$, $\delta βασιλέας$. Of the pronouns, $\epsilon\mu\acute{\epsilon}$ often appears as $\epsilon\mu\acute{\epsilon}\nu\alpha$, and $\sigma\epsilon$ as $\epsilonσ\acute{\epsilon}$ and $\epsilonσ\acute{\epsilon}\nu\alpha$; $\eta\mu\epsilon\iota\varsigma$ becomes often $\epsilon\upsilon\epsilon\iota\varsigma$, and in the accusative both $\epsilonμᾶ\varsigma$ and $\μᾶ\varsigma$; and $\epsilon\upsilon\mu\epsilon\iota\varsigma$ becomes $\epsilon\iota\varsigma$ and $\epsilonσ\epsilon\iota\varsigma$. The article as enclitic and proclitic is used for the personal pronoun in oblique cases. In the verbs, $\lambdaέγον\alpha\iota$ becomes $\lambdaέγον\upsilon$ or $\lambdaέγον\upsilon\epsilon$; $\epsilonλεγον$, $\epsilonλεγα\iota$; $\epsilonλεξας$, $\epsilonλεξε\iota\varsigma$; and for $\epsilonλ\acute{\epsilon}\xi\alpha\tau\epsilon$, $\epsilonλ\acute{\epsilon}\xi\epsilon\tau\epsilon$. In the passive, $\lambdaέγ\eta$ or $\lambdaέγ\eta\iota$ becomes $\lambdaέγεσαι$; $\lambdaεγόμεθα$, $\lambdaεγόμεστε$, and many other forms down to $\lambdaεγόμεσθα$. The verb $\epsilon\mu\acute{\iota}$ is conjugated almost like a verb in the middle voice, thus: $\epsilon\mu\acute{\iota}\mu\alpha\iota$, $\epsilon\iota\sigma\alpha\iota$, $\epsilon\iota\upsilon\epsilon$, $\epsilon\mu\epsilon\upsilon\theta\alpha$, $\epsilon\iota\sigma\theta\epsilon$, $\epsilon\iota\upsilon\epsilon$; imperfect, $\eta\mu\omicron\upsilon\mu\epsilon\upsilon$, $\eta\sigma\omicron$, $\eta\tau\omicron$, $\eta\mu\epsilon\upsilon\theta\alpha$, $\eta\sigma\theta\epsilon$, $\eta\tau\omicron\upsilon$; infinitive, $\epsilon\iota\sigma\theta\alpha\iota$; and imperative, $\epsilon\sigma\omicron$. The termination $\mu\epsilon$ is not found in the language of the common people. Modern Greek has also lost the old simplicity of expression, as may be seen by comparing a sentence from Plutarch's "Life of Cæsar" with Rangabe's translation: Original— $\text{Ἀλλὰ Κουρίον τε λέγεται τῇ τῆβέννῳ περιβαλὼν ὅπεξαγαγεῖν, αὐτὸς τε ὁ Κικέρων, ὡς οἱ νεανίσκοι προσέβλεψαν, ἀνανεῦσαι, φοβηθεὶς τὸν δῆμον, ἢ τὸν φόνον ὧλος ἀδικον καὶ παρὰνομον ἡγούμενος.}$ Translation— $\text{Ἀλλὰ λέγεται ὅτι ὁ Κουρίων περικάλυψας τότε αὐτὸν διὰ τῆς τῆβέννου του, τὸν ἐξήγαγε καὶ ὁ Κικέρων, ὅταν οἱ νέοι προσέβλεψαν εἰς αὐτὸν, ὅτι ἐνευσεν ἀποφατικῶς, φοβηθεὶς τὸν δῆμον, ἢ τὸν φόνον ὧλος ἀδικον καὶ παρὰνομον θεωρῶν.}$ The words are still the same that Plutarch or even Thucydides might have employed.—The grammatical and lexicographical study of Greek was begun by the sophists, especially Protagoras, by Plato, and by Aristotle in regard to rhetoric. After the decline of Grecian liberty and language many words and phrases became obsolete, and were explained by the grammarians under the titles of $\lambdaέξε\iota\varsigma$ and $\gammaλῶσσαι$. There were $\gammaλῶσσαι$ $\iota\alpha\tau\rho\iota\kappa\alpha\iota$, $\nu\omicron\mu\iota\kappa\alpha\iota$, $\rho\eta\tau\omicron\rho\iota\kappa\alpha\iota$, $\phi\iota\lambda\omicron\sigma\omicron\phi\iota\kappa\alpha\iota$, $\theta\epsilon\omicron\lambda\omicron\gamma\iota\kappa\alpha\iota$, and $\gammaλῶσσαι$ $\beta\alpha\rho\beta\alpha\rho\iota\kappa\alpha\iota$, $\Sigma\kappa\upsilon\theta\iota\kappa\alpha\iota$, $\Pi\epsilon\rho\varsigma\iota\kappa\alpha\iota$, &c. Homeric lexicons appeared at an early age; one of them was Apollonius's $\Lambdaέξε\iota\varsigma$ Ὅμηρικαί , in which the youth of republican Athens searched for elucidations of the poet. Didymus compiled a "Tragic Lexicon," Theo a "Comic Lexicon," and Phrynichus a kind of dictionary, containing the more recondite and exquisite phrases of the Attic writers, and entitled $\text{Προπαρασκευῇ Σοφιστικῇ}$. Pausanias of Cæsarea seems to have written the best rhetorical lexicon, containing illustrations of the Greek orators, as it is often quoted by Eustathius. The first who reduced into one vocabulary the Homeric, dramatic, and rhetorical lexicons was Diogenianus, a celebrated grammarian, who lived in the time of Hadrian. The most prominent writers on grammar were Aristophanes Byzantinus (about 260 B. C.), Aristarchus of Samothrace (about

150), and Dionysius Thrax (about 80), who prepared the first systematic grammar, which remained for many centuries of great value, subsequent grammars being little else than commentaries on it. Photius, patriarch of Constantinople, was the author of a celebrated lexicon, which he entitled *Λεξικὸν Συναγαγῆς*. But the most important of all the ancient lexicons is that of Hesychius, a grammarian of uncertain age, who seems to have compiled it from a vast number of sources. The dictionary of Suidas, a Christian monk who lived about the 11th century, differs from the other ancient lexicons, as it contains biographical notices of celebrated authors, and large extracts from their works. In western Europe but few were acquainted with the Greek language previous to the emigration of the Greeks to Italy in the 14th and 15th centuries. The early Greek scholars were Bede, Aleuin, John Scotus Eriugena, Humbert, Abélard, John Basing, Robert Grosseteste, Roger Bacon, and a few others. It is difficult to determine to what extent they were acquainted with the language, but in all probability their knowledge of it was insignificant. In 1476 the Greek grammar of Constantine Lascaris was published at Milan; it was the first attempt at printing from Greek types; in the printed editions of Greek classics of an earlier date Greek words were inserted with a pen. The first Greek and Latin dictionary was compiled by a Carmelite friar of Piacenza named Joannes Crastonus. It was a bare vocabulary, but was frequently reprinted with continual additions, "till at length," says Henry Stephens, "unlearned printers contending who should put forth the biggest lexicon, and offering rewards to those who would furnish the greatest number of words, the explanations, which were in the first instance so meagre, became as fat as a Boeotian sow." (See DICTIONARY.) Greek learning dawned in England toward the close of the 15th century. Milling, Selling, Latimer, More, Colet, Grocyn, and Linacre were known as students of Greek before Erasmus came to teach it at Cambridge in 1510. Later appear the names of Lilly, Lupsett, Lister, Pace, Lee, Tunstall, Stokesley, Clement, Brian, Wakefield, Bullock, Croke, Tyndale, Smith, Redman, and Cheke as Greek scholars. In France were Lefèvre d'Étaples (Faber Stapulensis), who was able to criticise the Greek of Erasmus, and Budé (Budæus), who was beyond question the most profound Greek scholar in Europe. Germany produced Reuchlin and his younger contemporary Melancthon, who even in his youth was deemed the peer of Erasmus; and next to them Beatus Rhenanus, Luscinius, Willibald Pirckheimer, Camerarius, Grynæus, and Hessius. In Italy Greek was in a measure superseded by the study of Latin. Vettori enjoyed the highest reputation as a student of Greek, and next to him Bonamico, Nizzoli, Parrhasio, Corrado, and Maffei. The study seems to have been

little prosecuted in Spain. The Greek grammars of this period were by Clenardus (Louvain, 1530), and by Varenius of Mechlin (Louvain, 1532), both of which were often reprinted, and the former is still the basis of several modern works, such as the Eton Greek grammar. The year 1572 became an epoch in Greek learning by the publication of Stephens's *Thesaurus*. Subsequently Greek became better known, and the greatest authorities upon it were Scaliger, Casaubon, Canter, and Sylburgius. But Greek learning declined in the 17th century. Hallam says: "The decline was progressive; few scholars remained after 1620, and a long blank ensued, until Fabricius and Kuster restored the study of Greek near the end of the century. Even in France and Holland, where many were abundantly learned, and some accomplished philologists, the Greek language seems to have been either less regarded, or at least less promoted, by eminent scholars, than in the preceding century." During the 17th and 18th centuries the progress of Greek learning was mainly due to the labors of Bentley, Stanley, Pearson, Price, Hudson, Potter, Baxter, Burney, Boyle, Viger, Fischer, Labbe, Scot, Erasmus Schmidt, Fronton du Due, Gruter, Heyne, Heinsius, Matthiæ, and Hermann. Buttman's *Ausführliche griechische Sprachlehre*, in the revised edition of 1819, must be considered the first grammar that can lay claim to scientific method and completeness. Thiersch carefully investigated the most ancient phases of the language, and Passow's lexicographical labors have the special merit of having been made on a sound historical basis. Lobeck carefully revised Buttman's grammar and rendered it available to modern students. Rost, Kühner, Krüger, and Mehlhorn introduced into their grammars the results of comparative philology. Later Greek grammars and lexicons are principally due to the labors of Germans, other nations having contented themselves with translating and rearranging them for the educational purposes of their own country. In fact, the contributions made in Germany toward Greek philology during the last 50 years are enormous. Every small division of the study has been specially represented by numerous publications. The principal authorities on the alphabet alone are Bäumlein and Kirchhoff; on pronunciation, Seyffarth, Liskovius, Gotthold, and Ellissen; on the digamma, Sachs, Peters, Savelsberg, and Leskien; on the hiatus, Benseler; on quantity, Spitzner and Passow; on accentuation, Götting, Geppert, and Winkler; on word building, Hempel, Budenz, Rödiger, Clemm, E. Curtius, and G. Curtius; on inflection, Koch, Reimnitz, Grotefend, Kolbe, Lissner, Ahrens, H. Müller, Aken, Francke, Döderlein, Becker, Sander, and Traut; on syntax, Bernhardt, R. Kühner, Schmidt, Fritsch, Weber, Ebhardt, Geist; on dialects in general, Ahrens; on Æolic, Giese and Hirzel; on Attic, Krasper and Diefurt; on Bucolic, Mühlmann; on

Cretan, Bergmann; on Cypric, Schmidt; on Epic, Gräfenhan, Lucas, and Berger; on Ionic, Lobeck. The best lexicons are by Rost and Palm, Kreussler, Keil, Peter, Schneider, Pape, Ramshorn, Jacobitz and Seiler, Benseler, and Lucas. Lexicons for the writings of single authors or groups of authors are: for Æschylus, by Wellauer; for Euripides, by Beck; for Herodotus, by Schweighäuser; for the Homeric writings, by Döderlein; for Hyperides, by Westermann; for Plato, by Ast; for Sophocles, by Schneider and Ellendt; and for the tragedians, by Fähsse. English scholars of Greek lexicography and grammar are: Green, Lightfoot, Evelyn Abbott, J. B. Mayor, A. A. Vansittart, Kennedy, R. Ellis, E. B. Cowell, Henry Jackson, W. M. Leake, Chandler, Simcox, Wordsworth, Peile, Donaldson, Liddell, Trench, Scott, Yonge, Ferrar, and others. American writers on the Greek language are: Pickering, Anthon, Crosby, Spencer, Hadley, Goodwin, Kendrick, Sophocles, Drisler, and Felton.—**LITERATURE.** In its widest extent, the history of Greek literature is coeval with that of the language. It begins in a period of indefinite antiquity, and comes down to the present day. If we commence with the earliest monuments, we trace it back to nearly 1000 B. C., where we find the art of poetical composition existing already in the highest perfection, in the form of epic narrative. The admirable structure and the wonderful language of the Homeric poems imply a long period of antecedent culture, striking intimations of which are found in the poems themselves. Poetry preceded prose, in the form of hymns to the gods, and songs or ballads in celebration of martial deeds. Of the earliest temple poetry no specimens have been preserved, but the Homeric hymns may give us some idea of their style. Of the earliest ballads also, none have come down to us; but the song of Demodocus in the *Odyssey* no doubt very fairly represents their primitive style of composition. The ballads were essentially epic, and led in the course of time to the proper epic, which is found in its perfect type in the *Iliad* and the *Odyssey*. The temple poetry appears to have originated in the north of Greece, and in the temples of Dodona, Delphi, and other primeval seats of Greek religious culture. Ballad poetry probably appeared very early on the Greek mainland; but its full development took place among the Ionian colonies of Asia Minor and the *Ægean* islands. The principal names of the legendary minstrels were Amphion, Orpheus, Thamyris, Eumolpus, Musæus, Linus, Olen, and Olympus. The earliest literary documents are the poems known as the *Iliad* and the *Odyssey*, founded on the legends of the war of Troy and the return of Ulysses; but nothing positive is known of the poet, nor where and when they were composed. (See HOMER.) About 50 compositions of various length, in a style closely resembling that of the *Iliad* and *Odyssey*, together with a burlesque poem called *Batrachomyomachia*, or the “Bat-

tle of the Frogs and Mice,” have also been attributed to Homer. The epic style was continued by a series of poets called the “cyclic,” of whose works only the titles, brief abstracts, and fragments have been preserved. The next development of poetry was in *Bœotia*, in the works of Hesiod, who also employed the epic style. His principal poems are the “Works and Days,” and the *Theogonia*. The next form of Greek poetry was the elegiac, and, in close connection with it, the iambic. The rhythm of the epic poetry was dactylic, and the metre hexameter. The Ionians of Asia Minor were also the originators of the elegiac and iambic. The elegiac rhythm was also dactylic, and its measure alternately hexameter and pentameter; or rather, every alternate verse consisted of two catalectic trimeters. The principal poets in this style were (between 700 and 600 B. C.) Archilochus, Callinus, Simonides of Amorgos, who shares with Archilochus the credit of having invented the iambic trimeter, Tyrtaeus, author of the martial elegies, Mimnermus, and Solon. This species of composition is sometimes ranked with the lyric; but it is more properly to be considered as a transition from the epic to the proper lyric. The principal orders of lyric poetry were pæans, hyposchemas, parœnia, scolia, embateria, and epinicia. The forms of composition were strophic, *i. e.*, with divisions called strophes, corresponding to each other line for line; and choral, with strophes corresponding by pairs, or with these and proœdes, mesodes, and epodes. The rhythms were of the richest variety, and artfully constructed so as to express by their movement the sentiment or passion intended to be conveyed by the language. The strophic composition was usually delivered with a simple musical accompaniment; the choral, with a musical accompaniment and a rhythmical motion, sometimes a dance performed by the trained *choreutæ*, or members of the band who delivered it. Of the lyric style, there were two principal schools, the *Æolic* and the *Doric*. The *Æolic* flourished chiefly among the *Æolian* colonies of Asia Minor, and especially in Lesbos. The *Doric* was more generally diffused over Greece, Asia Minor, Sicily, and even Italy. The principal writers of the *Æolian* poetry, which was strophic in form, were Alcæus (about 600) and Sappho, his contemporary, both Lesbians. Akin to this school may be considered the lyric poetry of Anacreon (about 500); not the odes which pass under his name, but the fragments which alone represent his genuine compositions, and which are rather Ionic than *Æolic* in tone and style. Of the poets who form, as it were, a transition to the proper *Dorian* choral poets, Alcman and Stesichorus may be placed at the head. Stesichorus (600) was the first to introduce the epode, and to give a greater variety to the rhythm of the strophes than had been customary. His language was the old epic, modified by some *Dorian* forms. Simonides of Ceos flourished about 500; Iby-

cus about 540; Bacchylides was the nephew of Simonides. We come now to the greatest master of the Dorian lyric style, and perhaps the greatest lyric poet of all ages, Pindar, born at Cynoscephalæ in Bœotia about 522. Of his numerous compositions, we have only the four series of epinician odes, *i. e.*, odes written in commemoration of victories gained at the four national festivals, the Olympic, Pythian, Nemean, and Isthmian. These are the most important specimens that have come down to us from the lyrical age. We say the lyrical age, because lyrical composition was the characteristic style during this period, although it continued to be cultivated with other species in the subsequent times.—The earliest writers of prose were those who first engaged in philosophical speculations. Of their writings only a few fragments have been preserved. Thales was the founder of the Ionic philosophy, to which belonged Pherecydes, Anaximander, Anaximenes, Anaxagoras, &c. Pythagoras established the Italian school, and was followed by Alcmaeon, Timæus, Epicharmus, Theages, Archytas, and others. In history the Ionians took the lead. Cadmus of Miletus, about 540, is the earliest; Aesylaus of Argos soon followed. Hecataeus of Miletus came somewhat later; Pherecydes of Leros, Charon of Lamprus, Hellanicus of Mitylene, Dionysius of Miletus, all preceded Herodotus, but were rather chroniclers than historians in the proper sense of the word. The first great historian was Herodotus of Halicarnassus (born in 484), who, though a Dorian by birth, wrote in the Ionic dialect. His delightful work is preserved, and its extraordinary merits have given him justly the name of the "father of history." Literature was cultivated later in Athens than in the Asiatic colonies; but the foundations were more deeply laid, and that famous city must always be regarded as the teacher of the world in arts and letters. We have already mentioned Solon among the elegiac poets. The Athenians were of Ionian descent, and their literature may be regarded as the continuation and perfection of the literature of that race. But the characteristic form of Athenian poetry was the dramatic. During the long period of democratic Athens, especially in the time of Pisistratus, much was done for the patronage of literature and literary men. The Homeric poems were carefully revised, and the regular reading of them was one of the public entertainments of the Panathenaic festival. Dramatic poetry, in a partially developed form, had already existed elsewhere; the dithyrambic tragedy had made its appearance. The dramatic element in the Homeric epics, especially the *Iliad*, could not fail to strike the listeners at the festivals, and to suggest the idea of representing instead of narrating events; of exhibiting persons in action rather than describing them. The dramatic pageantry of the Dionysiac worship furnished another suggestion of the dramatic form. The actual starting

point of the Greek drama was the choral song, tragedy springing from the dithyramb and comedy from the phallic representation. But the direction given to the new style was determined by the several influences we have mentioned. Thespis took the first step (535), by adding action to the chorus. He was followed by Phrynichus, who was the first to bring female characters upon the stage; his "Capture of Miletus" was performed in 498. Chœrilus was his contemporary and rival. Pratinas of Phlius lived in the same period. Æschylus, the perfecter of tragic art, was born at Eleusis in 525. This great poet added a second actor, and lived to see the tragic art raised to its highest point of excellence by his own genius and that of Sophocles, who added a third. Greek tragedy is well represented by the remaining works of Æschylus, Sophocles (born in 495), and Euripides (480). Of each of the two former only seven plays are in existence; of the last there are 19, viz.: 17 tragedies, one tragi-comedy, and one satyric drama. It was the practice of the tragic writers to combine in one representation three tragedies, and a kind of farce, called a satyric drama, because the chorus consisted of satyrs. But instead of a satyric drama, the *Alcestis* of Euripides shows that sometimes the representation was closed by a piece resembling the modern tragi-comedy. The three tragedies were called a trilogy, and the four pieces together a tetralogy. Of the tragic poets who succeeded the three great masters, or were their contemporaries, only the titles of plays and brief fragments remain. Comedy went along with tragedy, and sustained very peculiar relations to it. It originated probably among the Dorians, and was brought into regular form by Epicharmus about 500 B. C., and he is therefore justly called the inventor of comedy. Of the proper Attic comedy Chionides and Magnes were among the earliest writers; but of their works only a few titles remain. Cratinus first exhibited about 450; 88 titles of his comedies have been collected. Crates wrote about the same year, and Phrynichus the comic poet lived a little before the Peloponnesian war; the names of 10 of his comedies are extant. Eupolis exhibited for the first time in 429; he was a contemporary and rival of Aristophanes. Of the 54 comedies which Aristophanes wrote (according to Suidas), only 11 have come down to us. His first recorded exhibition was in 427, and his last in 388. From these plays, 10 of which belong to the old comedy, *i. e.*, to that period of Attic comedy in which public and private characters were introduced by name, we can form a distinct idea of the character and tendencies of this branch of the Attic drama. There were many other writers of the old comedy, but only their names and a few fragments have been preserved. The middle comedy is that form which comedy assumed when it was forbidden by law to introduce living persons by name. Thirty-four poets belonging

to this branch are mentioned, but none of their works, of which an immense number were known to the ancients, have been preserved, except in unimportant fragments. The names of three sons of Aristophanes occur in this number. The new comedy was a still further modification which comedy first assumed in the age of Alexander. Its distinguishing characteristic was, that all its characters were fictitious. The earliest writer was Philippides, who flourished about 323. The two most celebrated names were Philemon and Menander, the former of whom wrote 97, and the latter 105 plays. Numerous fragments of Menander, some of them of considerable length, show the elegance of his style and the variety and vigor of his genius. The last poet of the new comedy was Posidippus, who began to exhibit in 289; he wrote more than 50 pieces. The fertility and excellence of the Greek dramatic literature were most remarkable. The Dionysiac festivals, celebrated at Athens in the spring, were the principal occasion on which new pieces were brought out, and always in competition for the prize, and under the direction of the chief magistrates. The emulation thus excited among men of the highest genius gave a wonderful impulse to this species of composition, the originality and extent of which have always appeared so surprising.—The prose compositions that belong to this age were equally distinguished by their appropriate excellences. In history, we have Thucydides, born about 471, whose work on the Peloponnesian war is not only the first specimen of what has been called philosophical history, but remains unsurpassed down to the present time. Xenophon was born about 444. His historical works, though not equal to that of Thucydides in vigor of coloring and depth of reflection, yet are adorned with every grace of narrative and description. His other works are valuable for the light they throw on the spirit of Greek institutions and the peculiarities of Greek life. Of the works of Ctesias, Philistus, Theopompus, and Ephorus, which belong to a period somewhat later, none have come down entire. In philosophy, to which the teachings of Socrates (born in 469) gave a great impulse, we have the writings of Plato (about 429) and his pupil Aristotle (384). Plato was endowed with a brilliant imagination, and loved to soar into the highest region of speculation. His sense of the beautiful was exquisite; and his style was at once idiomatic and lofty, while in passages it moved with a rich and stately music which all ages have admired. Aristotle was a student and observer; practical results were the object of his investigations. His style was terse, logical, close, seldom adorned with poetical embellishments, and never with rhetorical exaggerations. Everything he wrote embodied the results of careful and extensive observations. He never entered the world of ideas with Plato. His views were comprehensive, and his exposi-

tions, except where the writing evidently contains only the heads of his discourses, are singularly clear. His works embrace the subjects of logic, rhetoric, physics, metaphysics, natural history, and politics. Plato founded the Academic school, whose point of reunion was the academy, on the Cephissus, north of Athens; Aristotle established the Peripatetic school, in the lyceum, near the Ilissus, on the opposite side of the city.—In the same period, political eloquence, always a characteristic form of Greek utterance, reached its highest perfection. In Homer we find not merely traces of eloquence, but admirable specimens. Public discussion was the general rule in the Greek republics. In Athens especially the statesman could not maintain himself, or exercise the smallest influence, without the faculty of public speaking. The historians relate the speeches of statesmen and generals. Thucydides describes the debates at Athens and elsewhere, on the questions that preceded and the events that occurred in the Peloponnesian war. Herodotus and Xenophon abound in speeches and orations; Solon, Pisistratus, Miltiades, Aristides, Themistocles, and Pericles were orators as well as legislators, counsellors, and generals. Pericles was the first to cultivate the art, and to adorn his mind with the teachings of philosophy and general literary culture. We have no exact report of any of the speeches of this class of statesmen, though Thucydides undoubtedly gives us the substance of several of the most important of those of Pericles. The rhetorical art in its technical character originated in Sicily; and the first rhetorical school at Athens was opened by Gorgias of Leontini. Other sophists and teachers of rhetoric were Protagoras, Prodicus, Hippias, &c. The peculiar judicial system also of Athens made a great demand for the rhetorical talent. The Athenian orators, whose works are extant in whole or in part, are Antiphon, Andocides, and Lysias in the 5th century; Isæus, Isocrates, Lycurgus, Hyperides, Æschines, Demades, Demosthenes, and Dinarchus in the 4th. The orations of these men present every variety of excellence, from the subtlest legal argument to the most passionate appeal. Demosthenes combines all the excellences of all the others, with some that are peculiar, at least in degree, to himself.—After the death of Alexander the Great, although literature continued to be cultivated in Greece, and especially in Athens, the rhetorical and philosophical schools holding an eminent position for centuries, yet till the Roman conquest the principal seat of letters and science was Alexandria, under the Ptolemies in Egypt. This period is called the Alexandrian age. Its characteristics were erudition, criticism, and the study of science; and in poetry the only original species was the bucolic or the idyl. The principal poets were Bion of Smyrna, Theocritus, Aratus (epic), Lycophron (author of "Cassandra"), Callimachus (epic, hymns), and Moschus. The bucolic poets are

picturesque and pleasing. During the Roman supremacy, and down to the introduction of Christianity, the principal poet was Nicander; the most important prose writers were Polybius, Apollodorus, Dionysius Thrax the grammarian, Diodorus Siculus, Dionysius of Halicarnassus, and Dionysius Periegetes. From this period to the close of the Roman empire in the West, there are two parallel series of writers, the pagan and the Jewish and Christian. Of the former, the most important are Babrius, Strabo, Epictetus, Plutarch, Dion Chrysostomus, Arrian, Polyænus, Pausanias, Marcus Antoninus, Aristides, Lucian, Pollux, Diogenes Laërtius, Achilles Tatius, Dion Cassius, Athenæus, Herodianus, Philostratus, Plotinus, Dexippus, Longinus, Palephatus, and Iamblichus; of the latter, Philo, Josephus, the authors of the books of the New Testament, Clement of Rome, Justinus, Polycarp, Irenæus, Clemens of Alexandria, Origen, and Athanasius.—During the period extending from the establishment of the seat of government at Constantinople, A. D. 330, to the beginning of the reign of Justinian I. (527), it was common to paraphrase the books of the Old and New Testaments, and to versify the lives of Christian martyrs. The best of this class of productions came from Egypt, though the empress Eudocia and Basil the Great, bishop of Constantinople, were also quite successful in it. Quintus of Smyrna undertook to furnish some additions to the *Iliad*, but in spite of his evidently faithful study of Homer's diction, he was not able to equal it in conciseness and force. Cyrus of Panopolis and Nonnus are the most distinguished poets of this period; next to them rank Tryphiodorus, Coluthus, Musæus, and Christodorus. The strangest production of this age is the so-called *Ῥυμῳκεντρα*, which give the life of Jesus in a kind of Homeric versification, and which are said to have been written either by the empress Eudocia or by Pelagius. The most distinguished ecclesiastical writers were Cyril, Basil, Chrysostom, Eusebius, Gregory Nazianzen, and Theodoret. The historians treated principally the history of the eastern empire, and the only work of this kind that has come down to us in a somewhat complete condition is Zosimus's account of the empire during the first four centuries. Next in importance is the ecclesiastical history of Socrates. Of Eunapius, Olympiadorus, Priscus, Candidus, Malchus, and Hesychius of Miletus, we have only a few fragments. The *Ἱστορίαι τῶν ἐν ταῖς αἰσὶν ἡγουμένων*, ascribed to Hesychius, is considered a forgery. Marcianus's *Periplus* and a geographical dictionary by Stephanus of Byzantium were the most prominent geographical works. The finest style was displayed in rhetoric. Himerius of Bithynia was considered a rhetorician above comparison, though the emperor Julian and his teacher Libanius appear to modern criticism far superior to him. Synesius and Procopius show that the art was beginning to decline. Works of imagination came prin-

cipally from the pens of Longus, Heliodorus, Achilles Tatius, Xenophon of Ephesus, and Eumathius, of whom the last is the poorest in invention, but the most prodigal with the coloring of Syrian diction. The grammarians Chæroboscus, Theodosius, Orion, and Hesychius were less devoted to independent studies than to copying diligently the works of their predecessors; and the bulky compilations of Hesychius are still of value.—The next period is that of mediæval Greek literature, extending to the conquest of Constantinople by the Turks in 1453. The abolition of the pagan schools by Justinian closed also the literature of paganism; nevertheless this period contains rather the history of the decay than of the growth of a literature. After Procopius, the only one who combined a profound knowledge of the political affairs of his country with simplicity of style, and after Agathias, who endeavored to imitate Procopius, there followed a small number of historians, like Petrus, Hesychius, Nonnosus, Theophanes, and Menander Protector, whose productions are neither trustworthy nor entertaining. The chronicle of Syncellus is the most important. The Egyptian Theophylactus Simocattes, the Hellene Georgius Pisides, and the Syrian Malalas, are vile in diction and vulgar in sentiment. Geographical studies were represented by the friar Cosmas Indicopleustes, who devised a new system to harmonize with the Bible. The best minds prosecuted juridical studies, such as Tribonianus, Dorotheus, Theophilus Antecessor, Theodorus, Stephanus, Cyrillus, Philoxenus, and others. During the 8th and 9th centuries, the period of iconoclasm, literature could be cultivated but little, and the preservation or tradition of many a Greek author is entirely owing to the literary tastes prevailing at the time in Armenia, Syria, and Egypt. The most celebrated man of the second half of the 9th century was Photius, the teacher of Leo the Philosopher; but the literary spirit developed during this period is best represented by Constantine VII. Porphyrogenitus, who collected all the literary productions of the past, whether valuable or worthless, long or short, and had them copied by a number of savants into a kind of cyclopædia of 53 books. New literary productions became exceedingly scarce, and the few that made their appearance were surprisingly deficient in logic, taste, and language. Among them may be mentioned the chronicles and memoirs of Leontius the younger, Genesius, Leo Grammaticus, Xiphilinus, Hippolytus, and Leo Diaconus, and above all the history of Anna Comnena. The manuscripts of this age swarm with errors in grammar and orthography. The chronicle of Simeon Sethos, toward the end of the 11th century, is considered the first monument in prose of modern Greek; but no poetical work is known that dates back further than the 12th century.—During the interval between the conquest of Constantinople and the struggle for independence in the 19th century, only

a very small number of literary productions deserve to be mentioned, aside from the works written in the service of the Greek church. In the 17th century the Greeks were admirers of a very weak idyllic form of poetry, especially of Drymticos's "Beautiful Shepherdess;" but a few compositions made their appearance which aimed at a more artistic style, and which were more elevated in sentiment, like the "Hellas" by Allatios. In a strict sense the literature of modern Greece cannot be considered older than the latter part of the 18th century, when Constantinos Rhigas sent out the patriotic songs that invigorated the national spirit of the Greeks. His most celebrated production is the imitation of the *Marseillaise*, beginning *Δεῖτε παῖδες τῶν Ἑλλήνων!* Adamantios Corais, often designated as the father of the literature of modern Greece, may more deservedly be called the literary Hercules of Greece, being a very prolific writer of medical treatises and translator of the classics. It is often asserted, but not equally evident, that he produced a revolution in the language of modern Greece. "His linguistic reform was a very simple one," says Geldart; "he proposed to use the classical terminations wherever these were not altogether obsolete, in preference to those which prevailed in the mouths of the common people." The Greeks were not slow to follow his rule and the example which he set. Accordingly, the language of the books is somewhat different from that of the people of Greece. On the threshold of the 19th century stand Christopoulos, Piccolos, and Rizos-Nerulos as writers of lyric songs, tragedies, and comedies, which are characterized by a comparatively pure diction, and also by imitations of French standards. The poetry of Christopoulos, whom the Greeks designate as the modern Anacreon, was successfully imitated by the brothers Alexander and Panagiotis Sutsos, Calvos, Solomos, and Angelica Pally. Other poets of the present time who deserve to be noticed are Alexander Rizos Rangavis or Rangabe, Orphanidis, Carasutsas, Valaoritis, Zalocostas, Naphtis, Vlachos, and Antoniadis. The sciences are represented principally by translations of the most noted works of the Occident, but original works are rapidly increasing. Historical works have been published by Paparigopoulos, Cumas, Sutsos, Tricupis, Philimon, Levkias, Zampelios, Surnelis, Venizelos, and Sathas. On the geography of various countries have written Philippidis, Constantas, Scarlatos Byzantios, Valetas, and Rangavis. Writers on archæology are Pantazis, Pittakis, Rangavis, and Lambros. Contributions to philology are furnished by Neophytos Ducas, Darvaris, Bambas, Asopios, Philip Joannou, Gennadios, Bernardakis, and Galanos. The most celebrated mathematicians are Vaphas, Pyrrhos, and Zochios. Theological and philosophical writers are Apostolidis, Contogonis, Adamidis, Kyriacos, and Agathangelos.—See Browne's "History of Classical Literature" (London, 1851); Mure's

"Critical History of the Language and Literature of Ancient Greece" (1854-'67); K. O. Müller's "History of the Literature of Ancient Greece," continued by J. W. Donaldson (1858); and Nicolai, *Geschichte der griechischen Literatur* (Magdeburg, 1865).

GREECE, Wines of. As a wine-producing country Greece no longer maintains the reputation which she enjoyed in ancient or even in comparatively modern times. With a climate admirably adapted to the culture of the grape, the area devoted to that purpose has steadily diminished. Among the causes which have contributed to this result are the impoverished condition of the soil of large tracts, formerly well wooded and watered, and the rude systems of viticulture in general use. With the destruction of its ancient forests parts of the country are gradually becoming an arid desert; and desolating wars, brigandage, and other internal troubles have combined to restrict the development of its agricultural resources. In consequence, the production of wine in Greece, which was still considerable during the Venetian supremacy in the 15th and 16th centuries, has dwindled to a comparatively insignificant amount. In like manner vinification has deteriorated to such a degree as to make Greek wines compare disadvantageously with those produced in much less favored localities. They contain, as a rule, a large amount of acetic acid, and many of them are rapidly converted into vinegar. To prevent this result various primitive practices are resorted to, such as smoking with wood smoke or vapor of resins, pitching the barrels, or adding gypsum, chalk, salt, &c., which render many of the wines unpalatable.—The country lying between the Turkish frontier and the isthmus of Corinth produces comparatively little wine of repute, the principal vineyards being near Lepanto, Charonea, and Megara, and on the slopes of Mt. Poliguna. The plain surrounding Mt. Hymettus, in the neighborhood of Athens, yields a wine which has been favorably mentioned by European connoisseurs. The Morea or ancient Peloponnesus, notwithstanding many disturbing causes, continues to produce considerable quantities of wine, of which that made near Pergos, amounting to about 1,500,000 gallons annually, is esteemed the best. Nauplia, called also Napoli di Malvasia, situated on the gulf of Nauplia, is noted as the place whence the Malvasia or malmsey wines derived their name. The vineyards suffered greatly during the Greek war of independence, and are now of little value. The islands of the Greek archipelago, and those in the Mediterranean colonized by the Greeks, were in ancient times more famous for their wines than the mainland, and their superiority in that respect is fully maintained at the present day. Of the islands of the archipelago, Santorin, the ancient Thera, is the most luxuriant. It is of volcanic origin, forming an imperfect ring, with the crater filled by the sea. The external slopes

furnish the wine lands, and every available piece of soil is under cultivation. The wines produced are white and red. The best red growth, known as Santorin, partakes of the nature of both port and claret, and is highly esteemed. Among the white varieties are the Thera, and a wine called the "wine of the night," of which two qualities are known to commerce, the Caliste and St. Elie, both rich and full-bodied. There is also a fragrant muscadine wine, known as the *vino santo*, and an amber-colored variety called the "wine of Bacchus." All of these wines doubtless preserve many of the qualities which made them acceptable to the civilized nations of antiquity. In ordinary seasons the island produces from 10,000 to 11,000 pipes, most of which goes to Russia. Next in importance are the yields of Zea (Ceos), Scio (Chios), Tenedos, and Samos, all but the first of which belong to Turkey. The Samian wine, notwithstanding the eulogistic allusion to it in Byron's verses, was considered by the ancients scarcely equal to the produce of some of the other islands. At the present day Tenedos is wholly devoted to the culture of the grape; its annual production is about 1,400,000 gallons, which is exported to Constantinople, Smyrna, and Russia, and is the common table wine of the Orient. The Ionian islands produce a considerable amount of dry and sweet wines. Those of Corfu are light and delicate, and those of Ithaca rich and luscious. All the wines of this group are plastered. The growths of Crete, Rhodes, and Cyprus, although Turkish dependencies, also come under the head of Greek wines. Crete, famous in ancient times for the abundance and excellence of her wines, is still a large producer, and for centuries her specialty has been Malvasia, the white sweet wine once universally drunk in western Europe under the name of malmsey. During the Venetian supremacy Crete and Cyprus supplied Europe with their choicest dessert wines, and the export of the former is said to have amounted to 200,000 casks annually. The principal vineyards are near Canea, Kisamos, Sphakia, and Candia. The wines of Cyprus are of three classes. The first consists of the wines of the commandery of the knights templars, made in the neighborhood of ancient Paphos, and which have a bouquet resembling the flavor of bitter almonds, said to be communicated to them by spices; the second is a sweet muscat, and the third a common wine, at first pale red, but which becomes colorless with time. These wines are fermented and matured in earthen vessels which preserve the shape of the ancient amphore. The vintage of the island has declined to less than a fifth of its production two centuries ago. Rhodes produces sweet and luscious wines from grapes of the size of plums.

GREEK CHURCH (also called the Greek Catholic, the Orthodox Greek, the Orthodox, or the Eastern church), that part of the Christian church which adheres only to the doctrinal de-

crees of the first seven œcumenical councils (of Nice, 325; Constantinople, 381; Ephesus, 431; Chalcedon, 451; Constantinople, 553 and 680; and Nice, 787), of the so-called Quinisextum of Constantinople, held in 692, and of the council held at Constantinople under Photius in 879 and 880, while it rejects the authority of all the succeeding councils recognized by the Roman Catholic church as œcumenical. A dogmatical difference between the Greek church and the church of Rome arose as early as 482, when the emperor Zeno endeavored to reconcile the Monophysites with the Catholic church by publishing a creed called the *Henoticon*, in which the disputed articles were entirely avoided. Felix II., the bishop of Rome, excommunicated the patriarchs of Constantinople and Alexandria for having been instrumental in issuing the *Henoticon*, and thus actually severed the communion between the churches of the East and of the West. The altered disposition of the court of Constantinople enabled Pope Hormisdas in 519 to restore the union, which however never became very firm again, and was repeatedly interrupted by decisions of the emperors in matters of faith, against which the bishops of Rome protested. The adoption in the western church of an article which declared that the Holy Spirit proceeded from the Son as well as the Father (*Filioque*), and its incorporation in the confession of faith at the synod of Toledo (589), constituted another point of dogmatic difference, although it did not awaken opposition in the Greek church until some time in the 8th century. Still more than these dogmatic differences, political and hierarchical reasons prepared a dissolution of the union. The patriarchs of Constantinople, to whom the councils of Constantinople (381) and Chalcedon (451) had assigned the second place among the patriarchs of the Catholic church, strove to obtain the first. The emperors claimed in the settlement of the numerous dogmatical controversies of the East a power which the bishops of Rome denied to them. The more Rome and Italy became politically estranged from the East, the more intolerable became the exercise of the supreme authority on the part of the bishop of Rome. A temporary dissolution of the union again took place in 732, when the pope condemned iconoclasm, which was approved of by several emperors, and by a synod of Constantinople in 754. More serious than ever before became the conflict between the two churches when the patriarch Photius, whose accession in 858 was due to the influence of the court, was rejected by Pope Nicholas I. as an intruder. A circular was then sent forth by Photius, censuring the observance of Saturday as a fast, the use of eggs and cheese during the first week in Lent, the administration of confirmation exclusively by bishops, the prohibition of the marriage of priests, and the use of the words *Filioque* in the Nicene creed. At a synod convened by Photius at Constantinople in 867 the pope was

excommunicated and deposed. Besides these errors, the Roman church was charged with having drawn the Bulgarians into ecclesiastical connection with Rome, though they had been converted by Greeks. Since Photius the relations of the eastern church to that of Rome have never been reestablished in a definite form, though the great schism was not fully declared before July 16, 1054, when Roman legates deposited on the great altar of the church of St. Sophia at Constantinople the sentence of excommunication which had been issued against the patriarch Cæciliarius, who in 1053 had added to the former charges of heresy brought against the Roman church that of using unleavened bread in the eucharist. At the council of Lyons (1274) Michael Palæologus allowed his representatives to subscribe to the Roman confession of faith, as he hoped thus to obtain aid against the Turks from the West; but when Pope Martin IV. excommunicated the emperor (1281), Greek synods held at Constantinople in 1283 and 1285 reaffirmed the independence of the Greek church. For the last time a union between the two churches was consummated at the synod of Florence (1439), by the Greek emperor and the patriarch himself. But the people and the great body of the inferior clergy were entirely strangers to any such union, and the conquest of Constantinople (1453) made the hostility of the Greek church to Rome still greater. The Roman Catholic church never ceased in its endeavors either to bring about a corporate union, or to gain over individual Greek congregations. Numerous Latin convents were established in the East, and in Calabria the Orosinian seminary was founded by Clement XII. for this special purpose. They succeeded in organizing a Greek United church, which acknowledged the supreme authority of the pope, while on the other hand it was permitted to abide by all the peculiar usages of the Greek church which did not affect fundamental doctrines, as marriage of the priests, reception of the Lord's supper in both kinds, use of the Greek language in the divine service, &c. In Russia, however, almost all the dioceses of the United Greek church were induced, under the reigns of Catharine II. and of Nicholas, again to dissolve their connection with Rome, and to pass over to the Russian church. It was believed that a portion of the clergy and of the people were opposed to this change of ecclesiastical relations, and several congregations in 1858 petitioned Alexander II. for permission to return to the United Greek church; but this was not granted, and that church in 1873 had become almost extinct in the Russian dominions. In general, the clergy and people of the Greek church have at all periods showed themselves decidedly hostile to a union with Rome, and numerous controversies, such as that under the patriarch Dositheus in Jerusalem on the holy sepulchre (1674), as well as the yearly repeated excommunication of the pope and

of his adherents, kept up this spirit of hostility. When, therefore, Pius IX. in 1848 again invited by an encyclical letter the entire eastern church to a corporate union with Rome, his proposition was rejected; and the invitations which in 1869 were addressed by the pope to the Greek bishops to attend the Vatican council were unanimously declined. There seems to be in the Greek church not even any organized party, as in most of the other eastern and some of the Protestant churches, which hopes and labors for a future union with the Roman Catholic church. The return to the Roman communion of numbers of the high Russian nobility, and the establishment of such societies as those of St. Dionysius in Turkey and St. Peter in Germany for effecting a reunion of the churches, have led to no appreciable result. The Protestants early sought to establish friendly relations with the Greek church. Melancthon in 1559 sent a Greek translation of the "Confession of Augsburg" to the patriarch of Constantinople, and in 1574 an epistolary correspondence on this confession took place between the theologians of Tübingen and the patriarch Jeremiah II., yet without success. Cyril Lucaris, who leaned toward Calvinism, was strangled in 1638. In modern times the Greek church has shown itself, in general, very hostile to the Protestant missionary schools, and to the Bible societies, though its literature shows a strong influence of Protestantism; a periodical, sympathizing with the principles of Protestant Christianity, was established at Athens in 1858, and found a large patronage. The high-church party in the church of England, which recognizes the Greek church as an orthodox branch of the church of Christ, sought to obtain from the Greek bishops the same recognition for itself, and the establishment of a closer intercourse, and a special society was established for promoting intercommunion between the two churches. The idea has found many zealous friends among the eastern bishops, and a friendly correspondence has sprung up between the dignitaries of the two churches, in which even the archbishop of Canterbury and the patriarch of Constantinople have taken part. The Greek church has manifested a profound interest in the progress of the Old Catholic movement. Prominent clergymen of that church attended and addressed the congresses held by the Old Catholics of Germany, and the hope was generally expressed that the movement might lead to the reunion of the eastern and western churches.—The internal history of the Greek church since its separation from the Roman Catholic is almost entirely destitute of great events. In 1588 Russia received an independent patriarchate, whereby the spiritual supremacy which the patriarch of Constantinople had virtually exercised over the church was abolished. In 1833 a synod of 36 Greek metropolitans, held at Nauplia, declared the orthodox eastern church of Greece independent

of every foreign authority; and in 1850 this independence was recognized by Constantinople. A great commotion within the Greek church of Turkey was subsequently caused by the Bulgarian nationalists, who objected to the appointment of non-Bulgarian bishops over Bulgarian dioceses. The Turkish government at length yielded to their demands, and organized a number of Bulgarian dioceses into an exarchate. A synod held in Constantinople in 1872, and attended by the patriarchs of Constantinople, Antioch, Jerusalem, and Alexandria, excommunicated the entire Bulgarian church organization, which, however, had the sympathy of the Russians. Dogmatic controversies rarely occurred, and a formation of new sects took place only in Russia, called forth not so much by doctrinal differences as by opposition to liturgical and hierarchical changes in the state church. With regard to other Christian denominations, as well as to Mohammedanism, paganism, and Judaism, the Greek church has kept itself almost exclusively on the defensive. In Russia, however, the government has succeeded in converting a large number of its non-Christian population, especially in Siberia, to the Greek church. The theological literature of the Greek church is not extensive; none of its works have ever been of marked influence on Roman Catholic or Protestant theology. During the present century, however, the number of ecclesiastical seminaries has considerably increased, and the periodical literature is also multiplying.—The Greek church recognizes the Bible and tradition as rules of faith; the latter, however, only so far as it is in accordance with the first seven œcumenical councils and the synods held at Constantinople in 692 (known among Latin canonists as the "council in Trullo" or Quinisextum), and in 879–880, presided over by Photius. A system of the doctrines of the Greek church, more complete, and, on account of its application of Aristotelian formulas, more scientific than any similar work in the Latin church up to that time, was compiled by the monk John Damascene (died about 760). The most important confessions of faith are: *Ὁρθόδοξος Ὁμολογία τῆς Πίστewος τῆς Καθολικῆς καὶ Ἀποστολικῆς Ἐκκλησίας τῆς Ἀνατολικῆς*, or *Confessio Orthodoxa*, by Petrus Mogilas, metropolitan of Kiev (also called the Russian catechism), published in 1640; and *Ἀσπὶς Ὁρθόδοξιας*, or *Synodus Hierosolymitana*, under Dositheus, in 1672. The former, which in 1643 was signed by all the Greek patriarchs, and solemnly recognized at the synod of Jerusalem in 1672 as the confession of faith of the oriental church (published in Greek and Latin, Amsterdam, 1662; Leipzig, 1695; in German by L. Frisch, Frankfurt, 1727), has everywhere, especially in Russia, symbolic authority. The latter was signed by 67 bishops and clergymen. None of the other books sometimes regarded as symbolical (*e. g.*, the two confessions of the patriarch Gennadios in Constantinople, and the confession of the

patriarch Jeremiah of 1580) has obtained so general a symbolic authority, and the confession of Metrophanes Kritopoulos of 1661 is only a private letter. (See Kimmel, *Libri Symbolici Ecclesie Orientalis*, Jena, 1843, and appendix to this work by Weissenborn, 1850.) Plato, a Russian archbishop and president of the academy of St. Petersburg, was the author of a catechism which in many points differs from that of Petrus Mogilas, and is less hostile to Protestantism. The Greek church holds in common with the Roman Catholic the doctrines of seven sacraments, of the sacrifice of the mass, of the veneration of the Virgin Mary, the saints, images, and relics, of the meritoriousness of fasting and other works, the hierarchical degrees of ecclesiastical orders, and monasticism. Its peculiar tenets are mainly the following: It disowns the authority of the pope, and, in controversies of faith, acknowledges the infallibility of œcumenical councils. At Constantinople baptism by immersion only is admitted as valid; but the Russian church considers baptism by immersion as a matter of rite, not of dogma. It administers the Lord's supper in both kinds, and gives confirmation and communion to children immediately after baptism. It denies the existence of a purgatory, yet prays for the dead, that God would have mercy on them at the general judgment. It maintains that the Holy Ghost proceeds from the Father, as principal, through the Son as medium. It admits of no images in relief or embossed work, but uses paintings and engravings in copper or silver. It approves of the marriage of priests, provided they enter into that state before their admission into holy orders; it condemns second marriages of priests, and fourth marriages of laymen. It keeps four fasts in the year more solemnly than the rest.—The churches are mostly built in the form of a cross. The altar stands toward the east under a vault which is higher than the nave, and separated from it by a partition board containing three doors, the middle of which is called the sacred door, and when opened permits the altar to be seen. At the beginning of the canon of the mass the doors are closed, and are not opened again until after the communion of the priest and deacon. Benches are not used, as the people stand during divine service, using a kind of crutch as a support. The principal act of worship is the mass, which all are bound to hear every Sunday. Only one mass a day is said in each congregation, and that before the rising of the sun. The liturgy used at the mass is known as that of the apostle James and Basil the Great. This work was again abridged by Chrysostom, and in this shorter form, which, however, has likewise undergone some changes in the course of time, it is used on common days, while the longer liturgy of Basil is still used at some of the higher festivals. The sermon, which is considered unessential, was formerly very rare, and consisted generally of a homily read from old collections.

The priests of Russia began in 1682 to preach their sermons instead of reading them from books, and gradually it became the general practice to preach at least twice a year. In 1858 many of the churches of St. Petersburg introduced the custom of having a sermon every Sunday. All the sermons, however, had to be submitted to the previous examination of the bishops, which censorship was abolished in the diocese of St. Petersburg at the beginning of 1859. Festivals peculiar to the oriental church are the consecration of water on Jan. 6, in commemoration of Christ's baptism, and the Orthodox Sunday, on which a curse is pronounced against all heretics. It is forbidden to use instrumental music in the churches, but the mass is generally accompanied by choirs of singers. Catechising is something rare, and the arrangements for religious instruction are very imperfect. The language used at divine service is among the Greeks of Turkey and Greece the old Greek, among the Russians and other Slavic nations the old Slavonic, and among the Georgians the old Georgian.—The clergy are divided into two classes, the higher and the lower clergy. The former class comprises the patriarchs, metropolitans, archbishops, and bishops; all of whom are chosen from among the monks, and must live in celibacy. The lower clergy are subdivided into the black clergy (so called after their dress) or monks, and the white or secular clergy, who wear blue, violet, or brown dresses. A convent is governed by an abbot or archimandrite (*ἀρχιμανδρίτης*); and among the other monks there are priors (*ἡγούμενοι*), priests (*ιερομοναχοί*), and deacons (*ιεροδίακονοί*), who can perform the same functions as the priests and deacons of the secular clergy. All the others are merely called monks (*μοναχοί*). The lower secular clergy are protopopes (*πρωτοπopeis*, arch priests), popes (priests), deacons, subdeacons, and lectors. The monks of the Greek church, as well as the nuns, who are less numerous, generally follow the rule of St. Basil, with the exception of those of Mt. Sinai and Mt. Lebanon, who follow the rule of St. Anthony. At the head of the female convent stands an *oikonomos*, who must be at least 80 years of age. He chooses a priest as confessor of the nuns, who also elect, under his presidency, an abbess (*ἡγουμένη*). The most celebrated convents are those of Mt. Athos, the convent of the holy sepulchre in Jerusalem, and that of Mt. Sinai in Arabia.—With regard to church constitution, the Greek church is made up of ten independent groups. I. The church of Constantinople is governed by a patriarch, who bears the title of "Most Holy Archbishop of Constantinople, New Rome, Œcumenical Patriarch." He has under him 129 bishops, of whom there are seven in Roumania, four in Serbia, and one at Venice. The churches of Roumania and Serbia incline to make themselves independent of Constantinople; and the Bulgarians, after many years of agitation, have at last succeeded in obtaining

from the Turkish government the establishment of a Bulgarian exarchate, which at first contained 12 dioceses, and which, on certain conditions legally provided, may be joined by any other dioceses in which the Bulgarians are predominant. The dioceses of the Ionian islands were, in consequence of the incorporation of the islands with Greece, transferred from the church of Constantinople to that of Greece. Throughout the immediate possessions of the Sublime Porte (*i. e.*, all European and Asiatic Turkey except Roumania and Servia) the patriarch of Constantinople has not only spiritual, but also a kind of temporal jurisdiction, as he is considered by the Turkish law the head of all the Greek Christians, who have to pay to him a yearly tax. He presides in the synod, the highest ecclesiastical board, which governs the Greek church of Turkey, and consists of all the patriarchs and a certain number of archbishops (properly 12), who have to take up their permanent residence at Constantinople. In certain cases, as the election of a patriarch, the holy synod has to act in union with the national assembly, a number of representatives of the most distinguished Greek families of Constantinople. The *hatti-humayum* of Feb. 21, 1856, provided for important changes in the relation of the patriarchs and the holy synod to the Greek church. They were to receive a fixed salary, to lose their temporal and judicial power, and the patriarchs and bishops were to be appointed for life. A supreme church council, to consist of priests and laymen, was to be elected by the entire church. II. The church of Alexandria counts five bishops, under the "Blessed and Holy Patriarch of the great city of Alexandria, of all Egypt and Pentapolis, of Libya and Ethiopia, Pope and Judge Œcumenical." The patriarch habitually resides at Cairo. III. The church of Antioch numbers 17 bishops. Its chief bears the title of "Blessed and Holy Patriarch of the City of God, Antioch, Syria, Arabia, Cilicia, Iberia, Mesopotamia, and all the East, Father of Fathers and Pastor of Pastors." IV. The church of Jerusalem has 14 bishops. The patriarch is called the "Blessed and Holy Patriarch of the Holy City of Jerusalem, of Palestine, Syria, Arabia beyond Jordan, Cana Galilee, and Holy Sion." V. The Russian church has 60 bishops, governed by the "Most Holy Synod directing all the Russians," which was first established by Peter the Great, and consists of three metropolitans, one archbishop, two other clerical and two lay members. VI. The church of the island of Cyprus counts four bishops, under the "Blessed and Holy Bishop of New Justiniana and of all the Isle of Cyprus." His see is at Nicosia. VII. The Greek church of Austria is divided into three jurisdictions entirely independent of each other. In the lands of the Hungarian crown there is a metropolitan for the Serb nationality at Carlovitz, and another for the Rouman nationality at Hermannstadt; there

are besides eight bishoprics. The Greek church of Cisleithan Austria has an archbishop (since January, 1873) at Czernowitz, and bishops at Zara and Cattaro. VIII. The church of Mt. Sinai has only one bishop, the "Blessed Archbishop of Sinai." IX. The church of Montenegro likewise has but one bishop, called "Metropolitan of Scanderia and the Seashore, Archbishop of Cettigne, Exarch of the Holy See of Ipek, Lord of Montenegro and of Berda." He had formerly both spiritual and temporal power, but recently the jurisdictions have been divided. The present bishop was induced by the Russian government to go to St. Petersburg, and not, as was done by his predecessors, to Constantinople, to receive episcopal consecration. X. The Hellenic church, in the kingdom of Greece, numbers 31 archbishops and bishops, governed by the "Holy Hellenic Synod" of Athens. The presidency of this board belongs by right to the metropolitan archbishop of Attica and Bœotia, residing in Athens. This board was established in 1852, and consists of five prelates of the kingdom. They meet annually in September, and have to take an oath of fidelity to the king before beginning their proceedings. All these ten divisions of the orthodox church recognize the supreme authority of a general council; but as no general council has been assembled for 1,000 years, they do not agree on the conditions required to make a council really œcumenical. In addition to these ten divisions, which recognize each other as orthodox, there are in Russia a number of sects, most of which fully acknowledge the doctrinal basis of the Greek church, but reject the liturgy of the Russian church as corrected by Patriarch Nicœn (1654), and therefore keep aloof from any intercourse with the state church. By the state church they are called *Raskolniki* (separatists), while they call themselves *Starovierti* (of the old faith). The number of these sects dissenting from the state is large. They also differ widely from each other, and some of them have placed themselves in open opposition not only to the liturgy and the government of the Russian church, but also to the doctrines of the Greek church in general. As from their origin they have been incessantly subjected to persecution, their peculiarities are but imperfectly known. The great argument employed against those of them who adhered to the orthodox doctrine of the Greek church was, that the true church is essentially episcopal; therefore they, having no bishop, could not be the true church. Some years ago, however, the Greek bishops of the Austrian empire ordained for them a bishop. The former rigor of the Russian government against them has been mitigated since the accession of Alexander II., and in 1859 an imperial decree even prescribed that the bishops of the state church shall in future ordain the priests and bishops of the *Raskolniki*.—The Greek church predominates in all Russia, Eu-

ropean Turkey, Greece, and Montenegro, and its area is continually extending by the progress of Russia in central Asia. The number of Greek Christians in Russia amounts to about 54,000,000. This, however, includes the sects, whose number is estimated at from 5,000,000 to 15,000,000. Turkey numbers about 12,000,000 inhabitants belonging to the Greek church, of whom 4,275,000 belong to Roumania, and 1,295,000 to Servia; Austria (according to the census of 1871), 3,050,000; the kingdom of Greece, 1,440,000; Montenegro, 125,000; Germany, about 3,000. In all other countries only a few Greek churches are found, nearly all of which are connected with Russian embassies. Thus the whole population connected with the Greek church in 1874 was about 74,300,000. The greatest number of United Greeks is in Austria, nearly 4,000,000; Turkey has about 50,000; Russia, 229,000; southern Italy, 80,000. They were formerly very numerous in Russia, where under the Polish rule a considerable portion of the church acknowledged the supremacy of the pope at the synod of Brzesc or Brest (1596). But most of them returned to the Russian state church under the reign of Catharine II., and the remainder at a synod in Polotzk in 1839. The total number thus lost by the Roman Catholic church in Russia is estimated at about 10,000,000. The Greek United church in Austria has two archbishops and six bishops; in Turkey, one patriarch (of Antioch) and eight suffragans; in Russia, one bishop at Chelm.—See Chytræus, *De Statu Ecclesiarum hoc Tempore in Græcia* (Rostock, 1569); Leo Allatius, *Græcia Orthodoxa* (2 vols., Rome, 1652 and 1659); Thomas Smith, *De Ecclesiæ Græcæ Statu Hodierno* (London, 1678); Le Quien, *Oriens Christianus* (3 vols., Paris, 1740); Wenger, *Beiträge zur Kenntniss des gegenwärtigen Geistes der Griechischen Kirche* (Berlin, 1839); H. J. Schmitt, *Kritische Geschichte der Neugriechischen Kirche* (Mentz, 1840); Wiggers, *Kirchliche Statistik* (2 vols., Hamburg, 1843); *L'Eglise orthodoxe d'Orient* (Athens, 1853); J. M. Neale, "History of the Holy Eastern Church" (London, 1847 *et seq.*); Dean Stanley, "Lectures on the History of the Eastern Church" (London, 1861; New York, 1870); Silbernagl, *Verfassung und gegenwärtiger Bestand sämtlicher Kirchen des Orients* (Landshut, 1865); and Gagarin, *Le clergé russe* (Paris, 1871).

GREEK FIRE, a name applied to compounds that burn on the surface of or under water. A summary of what is said about it in old writers is given by Gibbon in the "Decline and Fall of the Roman Empire," chap. lii. The subject is also ably treated by Dr. McCulloch in vol. xiv. of the "Quarterly Journal of Science." The Greek fire was most advantageously employed in the defence of Constantinople during the two sieges by the Saracens of A. D. 668-675 and 716-718. The secret of its preparation and use was derived from Callinicus, a deserter from the service of the caliph to that of the emperor. It appears to have been a compound of

bitumen, sulphur, and pitch, and to have been poured from caldrons, or projected in fire balls, or on arrows and javelins around which flax was twisted saturated with the inflammable compound. It was vomited through long copper tubes from the prows of fire ships. These were themselves consumed, as they sent fire and destruction among the galleys of the enemy. For 400 years its secret was successfully preserved by the Romans of the East, the vengeance of heaven being imprecated upon whomsoever should divulge this composition, which the people were taught to believe was revealed by an angel to the first of the Constantines. The Mohammedans finally obtained the secret, and in the crusades turned the art against the Christians. Joinville in his *Histoire de St. Louis* describes the fire as coming through the air like a winged long-tailed dragon, about the thickness of a hog's head, with the report of thunder and the velocity of lightning, producing so much light from the quantity of fire it threw out, that one might see in the camp as if it had been day. Its use was continued till the middle of the 14th century, when it gave place to gunpowder.—M. Niepce de St. Victor experimented, by request of the French minister of war, upon the property of benzole of burning upon water and igniting if a bit of potassium or of phosphuret of calcium be contained in it. On this principle he made an inextinguishable lamp, to be ignited by immersion under water, for attachment to buoys and life preservers. He found that if a glass vessel containing 300 grammes of benzole and half a gramme of potassium were broken on the surface of the water, the benzole would immediately overspread a considerable surface, bursting at the same time into flame. A mixture of three parts of benzole and one of sulphuret of carbon, being put into a hand grenade previously heated by immersion in boiling water, produced a disengagement of vapor, which could be ignited and would continue to burn from a jet until the whole was consumed. Phosphorus in solution increases its power of setting fire to other objects. Petroleum may be substituted for the benzole. It was thought that this might be used in naval warfare as the ancient Greek fire was employed. It was tried by the Paris commune in 1871, under whose direction many thousand petroleum bombs were thrown with disastrous effect. The subject is fully treated by Scoffern in his "Projectile Weapons of War and Explosive Compounds" (London, 1858), in which he also names several liquid mixtures that spontaneously ignite, and may be used for the same purposes as Greek fire. A solution of phosphorus in sulphuret of carbon thrown in a glass grenade was found, in experiments conducted at Woolwich, to ignite soon after the liquid was scattered. Chloride of sulphur may be substituted for the sulphuret of carbon, the ignition not taking place quite so soon, thus giving time for the liquid to penetrate into woodwork and

canvas. An abominable odor is diffused during the combustion. The arsenical alcohol, described under *KAKODYLE*, is proposed for a similar purpose, the fumes from which would greatly add to its deadly effects.

GREEK MYTHOLOGY. See *MYTHOLOGY*.

GREELEY. I. A central county of Nebraska, formed since the census of 1870, drained by branches of Loup fork of the Platte river; area, 625 sq. m. II. An E. county of Dakota territory, recently formed, and not included in the census of 1870; area, about 900 sq. m. It consists mostly of table land, being largely occupied by the "Coteau des Prairies," and contains several small lakes.

GREELEY, a town of Weld co., Colorado, on the S. bank of the Cache à la Poudre river, a few miles above its junction with the South Platte, and on the Denver Pacific railroad, 50 m. N. by E. of Denver; pop. in 1870, 480; in 1874, about 1,500. It is situated about 30 m. E. of the Rocky mountains, and is the centre of a rapidly improving region, well supplied with coal, stone, and timber. It contains three tanneries, two saw mills, a grist mill, three hotels, two banks, a graded school building costing \$25,000, two weekly newspapers, a quarterly and a semi-annual periodical, and six churches. Greeley was founded in April, 1870, by the Union colony, which was organized in New York on Dec. 23, 1869, and was named in honor of Horace Greeley, one of its promoters. The colony purchased 12,000 acres of land, and took the preliminary steps to secure a large amount more from the government. The town site was divided into 483 business lots, 660 residence lots, and 81 lots reserved for churches, schools, &c. The adjoining lands were divided into sections of from 5 to 40 acres, and each colonist was allowed to select one. A public square of 10 acres, planted with trees and beautified with artificial lakes, was laid out in the centre of the town, and an island in the river just above the town, embracing 50 acres and covered with cottonwood trees, was reserved for public use. All deeds of property contain clauses prohibiting the manufacture or sale of liquor in any form. An extensive system of irrigation has been established. The valuation of town property in 1874 was \$850,000; of farming lands, \$1,500,000.

GREELEY, Horace, an American journalist, born in Amherst, N. H., Feb. 3, 1811, died at Pleasantville, N. Y., Nov. 29, 1872. His ancestors were Scotch-Irish. His father, Zacheus Greeley, had settled on a small rocky farm, which he vainly tried to pay for and get a living from. Horace was a delicate and sickly child, but showed a remarkable appetite for learning. He could read almost as soon as he could talk, devoured all the books within reach, and so far surpassed his schoolmates that the leading men of the neighborhood offered to bear his expenses in a college course, which his parents declined for him. When he was ten years old the farm was sold by the sheriff, and

the family removed to West Haven, Vt. Horace had early conceived a strong desire to be a printer, and in 1826 he entered as an apprentice the office of the "Northern Spectator" in East Poultney, soon became an expert workman, and rendered occasional assistance in editing the paper. He kept up his studies, and was called the "giant" of the village debating society, being especially noted for his familiarity with political statistics. His parents meanwhile had removed to Erie co., Pa., and he had made two visits there, walking a large part of the way. In 1830 the "Spectator" was discontinued, and he went west in search of employment, finding it at Jamestown and Lodi, N. Y., and Erie, Pa. In August, 1831, he went to New York, reaching that city on the 17th, with \$10 in his pocket. He soon found employment by undertaking a job which no other printer would accept, it being a 32mo New Testament in very small type, with inter-columnar notes in still smaller. By working at this 12 or 14 hours a day he was able to earn but \$5 or \$6 a week, yet he persevered till the Testament was completed. He worked as a journeyman in several offices till Jan. 1, 1833, when he commenced business on his own account, with Francis V. Story as his partner. They printed the "Morning Post," the first penny daily ever published, which was owned and edited by Dr. H. D. Shepard. Story was drowned in July, 1833, and his place in the establishment was taken by Jonas Winchester. On March 22, 1834, the new firm issued the first number of "The New Yorker," a weekly folio (afterward changed to double quarto), devoted mainly to current literature, but giving also a summary of news, which soon became celebrated for the accuracy of its political statistics. Mr. Greeley was the editor. The paper reached a circulation of 9,000, and was continued seven years, but was never profitable. While engaged upon it Mr. Greeley wrote the leading articles for the "Daily Whig," and also edited for one year, 1838-'9, the "Jeffersonian," a political weekly published at Albany. In 1840 he edited and published the "Log Cabin," a campaign weekly devoted to the advocacy of Harrison's election to the presidency, which attained a circulation of 80,000 copies. On April 10, 1841, he issued the first number of the "Daily Tribune," which he says was "a small sheet, for it was to be retailed for a cent." Mr. Greeley was at first sole proprietor and publisher, as well as chief editor; but he soon formed a partnership with Thomas McElrath, who took charge of the business department. The "Daily Tribune" started with 500 subscribers, and of the first issue 5,000 copies were printed and sold or given away. In the autumn of 1841 the "Weekly Tribune" was commenced, the "New Yorker" and "Log Cabin" being merged in it. With these journals Greeley was closely identified during the remainder of his life, so that in the popular mind "Tribune" and "Horace Greeley" were interchangeable

terms; and of his work as a journalist and his influence on the rising profession of journalism he was confessedly and justly proud. In his autobiography he writes: "Fame is a vapor; popularity an accident; riches take wings; the only earthly certainty is oblivion; no man can foresee what a day may bring forth, while those who cheer to-day will often curse to-morrow: and yet I cherish the hope that the journal I projected and established will live and flourish long after I shall have mouldered into forgotten dust, being guided by a larger wisdom, a more unerring sagacity to discern the right, though not by a more unflinching readiness to embrace and defend it at whatever personal cost; and that the stone which covers my ashes may bear to future eyes the still intelligible inscription, 'Founder of the New York Tribune.'" In 1848 he was elected to congress to fill a vacancy, and served from Dec. 1 of that year till March 4, 1849, distinguishing himself by exposing and denouncing the abuses of the mileage system, but mainly through the columns of his journal, rather than from his place on the floor of the house. He was a warm advocate of industrial and social reforms, and was personally interested in the "North American Phalanx" (1843-'50), a socialist experiment near Red Bank, N. J., partly based upon the principles of Fourier. He labored zealously for the welfare of the poorer classes, and was a life-long opponent of slavery. Besides being continually busy with his editorial duties, he delivered numerous lectures and addresses at agricultural fairs, and occasional political speeches. His favorite topics were popular education, temperance, and labor organization. In 1851 he visited Europe, was a jurymen at the London crystal palace exhibition, and travelled rapidly through France, Italy, and Great Britain. In 1855 he made a second trip to Europe, spending six weeks in Paris. There he passed two days in prison, on the action of an obscure French sculptor, who claimed \$2,500 for damages to a statue which had been injured at the New York world's fair of 1853, of which Mr. Greeley was a director. He spent the winter of 1855-'6 in Washington, watching the memorable contest for the speakership and commenting on it in his letters to the "Tribune." For certain strictures on a resolution introduced by Albert Rust of Arkansas he was brutally assaulted by the latter in the capitol grounds, and was confined for several days by his injuries. In 1859 he visited California by the overland route, had public receptions in San Francisco and elsewhere, and addressed various assemblies on the Pacific railroad, political questions, &c. In 1860 he attended the republican national convention at Chicago, where he was largely instrumental in defeating the nomination of William H. Seward for president and securing that of Abraham Lincoln, though his preference was for Edward Bates of Missouri. This action was attributed to a personal feeling

of resentment on the part of Greeley, which is explained by the following extracts from a letter dated Nov. 11, 1854, which he addressed privately to Mr. Seward, but demanded for publication when it was referred to by the latter's friends during the canvass of 1860: "The election is over, and its results sufficiently ascertained. It seems to me a fitting time to announce to you the dissolution of the political firm of Seward, Weed, and Greeley, by the withdrawal of the junior partner, said withdrawal to take effect on the morning after the first Tuesday in February next. . . . I was a poor young printer and editor of a literary journal—a very active and bitter whig in a small way, but not seeking to be known out of my own ward committee—when, after the great political revulsion of 1837, I was one day called to the City hotel, where two strangers introduced themselves as Thurlow Weed and Lewis Benedict of Albany. They told me that a cheap campaign paper of a peculiar stamp at Albany had been resolved on, and that I had been selected to edit it. . . . I did the work required, to the best of my ability. It was work that made no figure, and created no sensation; but I loved it, and I did it well. When it was done, you were governor, dispensing offices worth \$3,000 to \$20,000 per year to your friends and compatriots, and I returned to my garret and my crust, and my desperate battle with pecuniary obligations heaped upon me by bad partners in business and the disastrous events of 1837. I believe it did not then occur to me that some one of these abundant places might have been offered to me without injustice; I now think it should have occurred to you. . . . In the Harrison campaign of 1840 I was again designated to edit a campaign paper. I published it as well, and ought to have made something by it, in spite of its extremely low price; my extreme poverty was the main reason why I did not. . . . Now came the great scramble of the swell mob of coon minstrels and cider-suckers at Washington, I not being counted in. . . . I asked nothing, expected nothing; but you, Governor Seward, ought to have asked that I be postmaster of New York." In the beginning of the civil war Greeley declared himself in favor of allowing the southern states to secede from the Union, provided a majority of their citizens voted in favor of that course. When hostilities were actually commenced, he demanded their vigorous prosecution, and was popularly held responsible for the "On to Richmond" cry, first uttered in the "Tribune," which preceded the defeat of Bull Run. In 1864, with the unofficial sanction of President Lincoln, he went to Clifton, Canada, to confer with George N. Sanders, Jacob Thompson, and Beverly Tucker, on the subject of peace. In that year also he was a presidential elector, and a delegate to the Philadelphia convention. At the close of the war he advocated a policy of universal amnesty with universal suffrage. In May, 1867,

he signed the bail bond of Jefferson Davis, thereby incurring so much popular censure at the north that the sale of his "History of the American Conflict," which had been very large on the publication of the first volume, suddenly stopped almost entirely on the second, then just issued. In 1869 he was the republican candidate for comptroller of the state of New York, but was defeated, though he received a larger vote than any other candidate on the ticket except Gen. Sigel. In 1870 he was a candidate for congress in the 6th New York district, and ran 300 votes ahead of the state ticket, but was defeated by the democratic candidate, S. S. Cox. Early in 1872 he made a journey to Texas, nominally for the purpose of delivering an address at the state agricultural fair and observing the industrial and commercial condition and prospects of the states he traversed; but probably the visit had also its political bearings, and he stopped at numerous places to make speeches and hold conferences with prominent citizens. On May 1 of that year a convention of so-called liberal republicans, who were dissatisfied with the administration, met at Cincinnati, and on the sixth ballot Mr. Greeley was nominated for president, B. Gratz Brown of Missouri being subsequently nominated for vice president. The democratic convention, which met at Baltimore in July, adopted these candidates and their platform. Mr. Greeley accepted the nomination, retired from the editorship of the "Tribune," and entered the canvass personally, travelling and speaking almost constantly till within a short time of the election. He received in the election 2,834,079 votes, against 3,597,070 for Grant, and carried the states of Georgia, Kentucky, Maryland, Missouri, Tennessee, and Texas. His powers of endurance had been strained to the utmost in the canvass, which was unusually exciting, and in which his foibles, his personal habits, and his anomalous political position were unsparingly caricatured and ridiculed. During the last month of it he was watching by the bedside of his wife, who died a few days before the election. Shortly after, he was prostrated by a disorder of the brain and sank rapidly. His funeral, though simple, was perhaps the most impressive ever witnessed in New York. The body lay in state in the city hall, through which an unbroken stream of visitors passed for an entire day; and the funeral services were attended by the president and vice president of the United States, the vice president elect, the chief justice, and many other eminent citizens from distant places. He died with a full belief in the doctrines of Universalism, which he had held for many years.—About the year 1852 Mr. Greeley purchased a farm of 50 acres, afterward enlarged to 75, on the Harlem railroad, in the township of New Castle, Westchester co., 35 m. N. of New York. The railroad station there was known as Chappaqua, from the Indian name of a mill stream which ran

through the place. Here for the last 20 years of his life he spent his Saturdays, working about the farm, his especial delight being in the woodland. His farming was not profitable, and was the subject of innumerable jests, all of which he took in good part, replying that he was only a farmer by proxy, and therefore did not expect to make money by it.—Mr. Greeley's published volumes are as follows: "Hints toward Reforms," consisting mainly of lectures and addresses (New York, 1850); "Glances at Europe" (1851); "History of the Struggle for Slavery Extension" (1856); "Overland Journey to San Francisco" (1860); "The American Conflict" (2 vols., Hartford, 1864-'6); "Recollections of a Busy Life" (New York, 1868); "Essays designed to elucidate the Science of Political Economy" (Boston, 1870); and "What I Know of Farming" (New York, 1871). His life has been written by James Parton (New York, 1855; new ed., 1868), and by L. U. Reavis (1872). See also "A Memorial of Horace Greeley" (New York, 1873).

GREEN. See LIGHT, and PAINTS.

GREEN. I. A central county of Kentucky, intersected by Green river, which is navigable by steamboats, and drained by several small streams; area, 525 sq. m.; pop. in 1870, 9,379, of whom 1,937 were colored. It contains much excellent limestone and a number of salt springs. The surface is undulating and hilly. The chief productions in 1870 were 34,098 bushels of wheat, 281,827 of Indian corn, 47,231 of oats, 87,222 lbs. of butter, and 1,375,091 of tobacco. There were 2,540 horses, 1,869 milch cows, 2,245 other cattle, 8,925 sheep, and 15,190 swine. Capital, Greensburg. II. A S. county of Wisconsin, bordering on Illinois, intersected by Pekatonica and Sugar rivers, the latter of which is a valuable mill stream; area, 376 sq. m.; pop. in 1870, 23,611. The surface is much diversified, the S. part consisting of prairies and the remainder being thinly wooded. The soil is very fertile. Limestone is abundant, and lead is mined. A branch of the Milwaukee and St. Paul railroad extends from Janesville to Monroe. The chief productions in 1870 were 541,859 bushels of wheat, 25,469 of rye, 947,105 of Indian corn, 743,019 of oats, 184,195 of potatoes, 909,485 lbs. of butter, 358,890 of cheese, 139,110 of wool, and 43,229 tons of hay. There were 9,744 horses, 11,474 milch cows, 15,506 other cattle, 39,477 sheep, and 35,879 swine; 2 manufactories of boots and shoes, 20 of carriages and wagons, 11 of clothing, 4 of barrels and casks, 4 of furniture, 12 of saddlery and harness, 3 of sashes, 11 of tin, copper, and sheet-iron ware, 6 of cigars, 2 of woollen goods, 2 flour mills, 10 saw mills, and 3 breweries. Capital, Monroe.

GREEN, Ashbel, an American clergyman, born at Hanover, N. J., July 6, 1762, died in Philadelphia, May 19, 1848. He graduated at the college of New Jersey in 1783, and was tutor and professor of mathematics and natural philosophy there till licensed to preach in 1786;

was ordained as colleague pastor of the second Presbyterian church in Philadelphia in May, 1787, and became pastor on the death of Dr. Sproat in 1793. He was chaplain of congress from 1792 to 1800. In 1809 he had a primary agency in forming the Philadelphia Bible society. He was one of the originators and most efficient friends of the theological seminary at Princeton. In 1812 he became president of Princeton college, but resigned in 1822 and returned to Philadelphia, where during the next 12 years he edited the monthly "Christian Advocate." He also preached to an African congregation for two years and a half, and rendered many important services in aid of the general interests of the church. Dr. Green was a clear, bold, and effective preacher, and an able college president. He was for nearly half a century one of the leading men of the Presbyterian church. He published a "Discourse delivered in the College of New Jersey, with a History of the College" (Boston, 1822); a "History of Presbyterian Missions," "Lectures on the Shorter Catechism" (2 vols.); 11 discourses, and various addresses, reports, &c.

GREEN, Horace, an American physician, born at Chittenden, Vt., Dec. 24, 1802, died at Sing Sing, N. Y., Nov. 29, 1866. He graduated in medicine at Middlebury, Vt., in 1824, and practised in Rutland till 1835, when he removed to New York. From 1840 to 1843 he was professor of the theory and practice of medicine in the medical college at Castleton, Vt., and in 1850 he accepted the same chair in the New York medical college, which he had that year assisted in founding. He resigned his professorship in 1860. In 1854 he and his colleagues established the "American Medical Monthly," of which he became one of the editors. Dr. Green was noted for his treatment of diseases of the throat and air passages by topical medication with nitrate of silver in solution. He published "Diseases of the Air Passages" (New York, 1846); "Pathology and Treatment of the Croup" (1849); "Surgical Treatment of the Polypi of the Larynx and the Œdema of the Glottis" (1852); "Report of 106 Cases of Pulmonary Diseases treated by Injections into the Bronchial Tubes with a Solution of Nitrate of Silver" (1856); "Selections from the Favorite Prescriptions of Living American Physicians" (1858); and "Pulmonary Tuberculosis" (1864).

GREEN, Jacob, an American author, born in Philadelphia, July 26, 1790, died there, Feb. 1, 1841. He graduated at the university of Pennsylvania at the age of 16, and immediately afterward published in connection with a young friend a treatise on electricity and galvanism. He was admitted to the bar, but never practised, and in 1818 was appointed professor of chemistry, experimental philosophy, and natural history in the college of New Jersey. This position he exchanged four years later for the chair of chemistry in the Jefferson medical college, Philadelphia, which he filled until his

death. He was the author of a number of scientific text books, including "Chemical Philosophy" (Philadelphia, 1829), "Astronomical Recreations," "Treatise of Electro-Magnetism," "Monograph of the Trilobites of North America," &c.; of papers in the "American Journal of Science;" and of "Notes of a Traveller through England and Europe" (3 vols., 1831).

GREEN, Samuel, an American printer, born in England in 1615, died in Cambridge, Mass., Jan. 1, 1702. He succeeded Day in the printing house at Cambridge about 1648. He printed the "Cambridge Platform" in 1649, the laws in 1660, and, in the Indian language, the Psalter, Eliot's Catechism, Baxter's "Call to the Unconverted," the New Testament, and 1,000 copies of the Bible in 1683. He had 19 children, and his descendants were a race of printers, living in Massachusetts, Connecticut, Vermont, and Maryland.

GREEN, Seth, an American fish culturist, born in Rochester, N. Y., March 19, 1817. A fisherman by occupation, his attention was early attracted by the gradual diminution of fish in the waters of the state, and in 1838 he began to devote himself to practical fish culture. In 1864 he organized the fish-breeding establishment at Caledonia springs in Livingston co., which he managed with great success for four years. In 1867 he invented a shad-hatching box, which has been extensively used in stocking the Connecticut, Hudson, and other rivers. He published a work on "Trout Culture" in 1870, and in 1871 succeeded in transporting 10,000 young shad from the Hudson to the Sacramento. He was for some years commissioner of fisheries of the state of New York, and is now (1874) superintendent of the state hatching house at Caledonia. He has been justly styled the father of American fish culture.

GREEN, William Mercer, an American bishop of the Protestant Episcopal church, born in Wilmington, N. C., May 2, 1798. He graduated at the university of his native state in 1818, studied for the ministry, and was ordained in 1820. He was appointed professor of rhetoric in the university of North Carolina in 1837, and was elected first bishop of Mississippi in 1849, and consecrated Feb. 24, 1850. Bishop Green was among the founders of the "University of the South," at Swannee, Tenn., in 1858, and became its chancellor in 1866, which post he still occupies (1874). He has published a "Memoir of Bishop Ravenscroft," and "Sermons on Apostolic Succession and Baptismal Regeneration."

GREEN BAY, a large arm of Lake Michigan, communicating with the W. side of the lake by a broad opening at which lies a group of islands. It partly separates Wisconsin from the upper peninsula of Michigan, and is 100 m. long from N. E. to S. W., and from 15 to 30 m. broad. It receives Menomonee, Fox, and several smaller rivers. The name Green was given it on account of its color, caused by its great depth, which is said to exceed 500 ft.

GREEN BAY, a city and the capital of Brown co., Wisconsin, on a low peninsula between Fox and East rivers, about 2 m. above the head of Green bay, 100 m. N. of Milwaukee; pop. in 1860, 2,275; in 1870, 4,666. It has a fine harbor, accessible by the largest steamers from Lake Michigan; while, by means of the improvements on Fox river and the canal across the portage, boats of 5 ft. draught have passed, during high water, by way of the Fox and Wisconsin rivers, from Lake Michigan to the Mississippi. The Wisconsin division of the Chicago and Northwestern railroad passes through Fort Howard (pop. in 1870, 2,462), a borough on the W. bank of the Fox opposite Green Bay, with which it is connected by a bridge and ferries. Green Bay itself is the terminus of the Milwaukee and Northern and the Green Bay and Lake Pepin railroads. The most important item of trade is lumber, about 79,000,000 feet, besides 200,000,000 shingles and 6,000,000 staves, the product of 40 or 50 mills in the surrounding country, being marketed here annually. The grain and flour trade is also considerable. The receipts in 1871, including Fort Howard, amounted to 539,102 bushels of grain and 110,000 barrels of flour. To accommodate this traffic, an elevator with a capacity of 225,000 bushels has been erected upon a pier which projects 800 ft. into the river, and along which the railroad tracks have been extended. The entire trade of the city in 1871 amounted to about \$3,500,000. It contains a number of noteworthy public buildings, including large warehouses, an elegant court house, and a well arranged opera house, and has many handsome residences. There are three national banks with an aggregate capital of \$200,000, 12 public schools, including a high school, a daily and three weekly (one German) newspapers, and 11 churches.—The first permanent settlement at Green Bay was effected by the French in 1745. A portion of the site was laid out about 1830 under the name of Navarino, and another portion in 1835 under that of Astor. They were incorporated as Green Bay in 1839, and in 1854 a city charter was granted. In the early part of this century it was a post of the American fur company.

GREENBRIER, a S. E. county of West Virginia, bordering on Virginia, intersected by Greenbrier river, a N. E. affluent of the Great Kanawha or New river, and bounded S. E. by a ridge of the Alleghanies; area, 680 sq. m.; pop. in 1870, 11,417, of whom 1,103 were colored. The soil of the valleys is fertile. The celebrated White Sulphur Springs are in this county, which is crossed by the Chesapeake and Ohio railroad. The chief productions in 1870 were 50,214 bushels of wheat, 181,381 of Indian corn, 92,295 of oats, 13,928 of potatoes, 174,865 lbs. of butter, 34,051 of wool, and 7,444 tons of hay. There were 2,805 horses, 3,201 milch cows, 6,199 other cattle, 13,880 sheep, and 5,733 swine; 4 saw mills, and 2 woollen factories. Capital, Lewisburg.

GREENBUSH, a town of Rensselaer co., New York, on the E. bank of the Hudson, opposite Albany, with which it is connected by two bridges; pop. in 1870, 6,202. It is the S. terminus of the Troy and Greenbush railroad, and is intersected by the Boston and Albany and the Hudson River lines. The depot of the latter is at a point locally known as East Albany. The town contains two saw mills, flour mills, a blast furnace, &c. It was incorporated in 1795, and in 1855 East Greenbush and North Greenbush were separated from it.

GREENCASLE, a city and the capital of Putnam co., Indiana, 1 m. E. of Walnut fork of Eel river, at the intersection of the Louisville, New Albany, and Chicago railroad with the St. Louis, Vandalia, Terre Haute, and Indianapolis, and the Indianapolis and St. Louis lines, 40 m. W. by S. of Indianapolis; pop. in 1870, 3,227. It is pleasantly situated on a high table land, and is the commercial centre of a rich farming and extensive stock-raising region. It contains a court house, a jail, a national bank, a large rolling mill and nail factory, seven public schools, including a high school, and several churches, and has two weekly newspapers. Indiana Asbury university (Methodist), situated here, was organized in 1835, and in 1874 had 10 professors and instructors, and 439 students, of whom 245, including 38 females, were of the collegiate grade. The Whitecomb and the college circulating libraries contain 9,000 volumes. There is also in the city a Presbyterian female college, having 5 instructors and 120 students.

GREENE, the name of counties in 14 of the United States. **I.** A S. E. county of New York, bounded E. by the Hudson river, and drained by Catskill creek and Schoharie river; area, 600 sq. m.; pop. in 1870, 31,832. The surface is broken by the Catskill mountains, which are mostly sterile. The valleys and level districts of the N. E. contain some excellent soil. A branch of the New York Central railroad from Schenectady terminates at Athens in this county. The chief productions in 1870 were 72,016 bushels of rye, 138,389 of Indian corn, 378,422 of oats, 97,947 of buckwheat, 276,787 of potatoes, 1,538,203 lbs. of butter, 52,147 of wool, and 103,357 tons of hay. There were 5,902 horses, 14,825 milch cows, 10,791 other cattle, 12,778 sheep, and 3,276 swine; 10 manufactories of carriages, 10 of bricks, 6 of barrels and casks, 1 of cotton goods, 8 of furniture, 5 of iron castings, 2 of machinery, 2 of paper, 9 of saddlery and harness, 4 of woollen goods, 5 ship yards, 4 saw mills, 7 flour mills, and 4 tanneries. Capital, Catskill. **II.** A S. W. county of Pennsylvania, bounded S. and W. by West Virginia and E. by the Monongahela, and watered by several small streams; area, 600 sq. m.; pop. in 1870, 25,887. It has a hilly surface and a fertile soil, and abounds in bituminous coal. The chief productions in 1870 were 255,584 bushels of wheat, 26,606 of rye, 749,520 of Indian corn,

438,222 of oats, 53,712 of potatoes, 759,135 lbs. of butter, 444,489 of wool, and 23,206 tons of hay. There were 7,278 horses, 7,369 milch cows, 15,380 other cattle, 121,135 sheep, and 19,580 swine; 7 manufactories of carriages, 6 of barrels and casks, 8 of furniture, 14 of saddlery and harness, 4 of stone and earthenware, 3 of woollen goods, 4 flour and 4 saw mills, 8 tanneries, and 6 currying establishments. Capital, Waynesburg.

III. A central county of Virginia, lying partly on the S. E. slope of the Blue Ridge, and bounded N. E. by Rapidan river; area, 230 sq. m.; pop. in 1870, 4,634, of whom 1,452 were colored. It has an uneven surface, traversed by some fertile valleys. The chief productions in 1870 were 36,060 bushels of wheat, 84,033 of Indian corn, 37,886 of oats, and 262,030 lbs. of tobacco. There were 1,046 horses, 885 milch cows, 1,221 other cattle, and 3,466 swine. Capital, Stanardsville.

IV. An E. county of North Carolina, drained by the Mackoson, an affluent of the Neuse river; area, about 280 sq. m.; pop. in 1870, 8,687, of whom 4,521 were colored. The surface is level and the soil fertile. Marl is found in several places. The chief productions in 1870 were 223,988 bushels of Indian corn, 23,521 of peas and beans, 44,531 of sweet potatoes, and 6,268 bales of cotton. There were 779 horses, 982 milch cows, 2,225 other cattle, and 9,657 swine. Capital, Snow Hill. **V.** A N. E. central county of Georgia, bounded S. W. by the Appalachee and Oconee rivers, the latter of which intersects the N. W. part; area, 374 sq. m.; pop. in 1870, 12,454, of whom 8,156 were colored. It is intersected by the Georgia and Athens branch railroads. It has a hilly surface, and the soil, though originally fertile, is partly worn out. The chief productions in 1870 were 24,651 bushels of wheat, 132,635 of Indian corn, 9,735 of oats, 13,971 of sweet potatoes, 63,020 lbs. of butter, and 5,699 bales of cotton. There were 829 horses, 993 mules and asses, 1,384 milch cows, 2,651 other cattle, 2,240 sheep, and 5,100 swine; 3 carriage factories, 1 cotton factory, and 6 flour mills. Capital, Greensborough. **VI.** A W. county of Alabama, bounded S. E. by Black Warrior river and S. W. by the Tombigbee, the two streams uniting at the S. W. extremity of the county, and being navigable by steamboats during half the year; area, about 750 sq. m.; pop. in 1870, 18,399, of whom 14,541 were colored. The surface is moderately uneven; the soil is fertile. The chief productions in 1870 were 207,782 bushels of Indian corn, 22,080 of sweet potatoes, and 9,910 bales of cotton. There were 1,077 horses, 2,101 mules and asses, 2,145 milch cows, 3,459 other cattle, 2,576 sheep, and 6,674 swine. Capital, Eutaw. **VII.** A S. E. county of Mississippi, bordering on Alabama, drained by Chickasawha and Leaf rivers, which unite in the S. part to form the Pascagoula; area, 830 sq. m.; pop. in 1870, 2,038, of whom 372 were colored. It has an undulating surface, a soil only moderately fertile, and pine

forests. The Mobile and Ohio railroad touches the N. E. corner. The chief productions in 1870 were 21,473 bushels of Indian corn, and 13,877 of sweet potatoes. There were 400 horses, 2,402 milch cows, 3,777 other cattle, 4,357 sheep, and 7,338 swine. Capital, Leakesville.

VIII. A N. E. county of Arkansas, bounded N. by Missouri, and separated from it on the E. by St. Francis river, and bordered S. W. by the Cache river; area, 950 sq. m.; pop. in 1870, 7,573, of whom 156 were colored. The surface is level, and the soil of the river bottoms fertile. The chief productions in 1870 were 10,890 bushels of wheat, 208,352 of Indian corn, 10,623 of oats, 12,904 of sweet and 7,691 of Irish potatoes, and 983 bales of cotton. There were 1,173 horses, 1,305 milch cows, 2,852 other cattle, 2,727 sheep, and 8,232 swine. Capital, Gainesville.

IX. A N. E. county of Tennessee, bordering on North Carolina, and traversed by Nolichucky river; area, 750 sq. m.; pop. in 1870, 21,688, of whom 2,064 were colored. It contains valuable beds of iron ore. The surface is elevated, uneven, and well timbered. It is traversed by the East Tennessee, Virginia, and Georgia, and the Cincinnati, Cumberland Gap, and Charleston railroads. The chief productions in 1870 were 238,716 bushels of wheat, 496,659 of Indian corn, 149,518 of oats, 21,296 of Irish and 11,331 of sweet potatoes, 268,411 lbs. of butter, and 7,124 tons of hay. There were 4,644 horses, 5,279 milch cows, 8,008 other cattle, 21,130 sheep, and 25,306 swine; 2 blast furnaces, 3 flour and 5 saw mills, 10 tanneries, and 7 currying establishments. Capital, Greeneville.

X. A S. W. county of Ohio, watered by Mad and Little Miami rivers; area, 432 sq. m.; pop. in 1870, 28,038. It contains limestone and variegated marble. The surface is undulating, and the soil consists of fertile clay. It is traversed by the Little Miami railroad, the Dayton, Xenia, and Western, and the Springfield branch, which connect at Xenia, the Atlantic and Great Western, and the Cincinnati, Sandusky, and Cleveland railroads. Antioch college is at Yellow Springs in this county. The chief productions in 1870 were 643,980 bushels of wheat, 10,674 of rye, 1,527,647 of Indian corn, 152,747 of oats, 22,491 of barley, 83,270 of potatoes, 370,179 lbs. of butter, 109,591 of wool, 277,360 of tobacco, 14,283 tons of hay, 1,137,675 lbs. of flax, and 38,998 bushels of flax seed. There were 7,585 horses, 5,741 milch cows, 8,695 other cattle, 29,320 sheep, and 3,395 swine; 2 manufacturing of bagging, 8 of bricks, 21 of carriages, 21 of clothing, 2 of barrels and casks, 1 of cordage and twine, 1 of gunpowder, 3 of linseed oil, 5 bakeries, 11 flour mills, 1 tannery, 1 currying establishment, 1 distillery, and 8 saw mills. Capital, Xenia.

XI. A S. W. county of Indiana, drained by the W. fork of White river; area, 540 sq. m.; pop. in 1870, 19,541. It is diversified by prairies, oak openings, and forests, and has a rich soil. The Indianapolis and Vin-

cennes railroad and the Wabash and Erie canal pass through it. The chief productions in 1870 were 190,647 bushels of wheat, 784,195 of Indian corn, 101,410 of oats, 39,639 of potatoes, 160,958 lbs. of butter, 79,319 of wool, 112,242 of tobacco, and 7,833 tons of hay. There were 6,464 horses, 4,530 milch cows, 8,132 other cattle, 30,341 sheep, and 26,195 swine; 5 flour mills, 11 saw mills, and 1 distillery. Capital, Bloomfield.

XII. A W. county of Illinois, bounded W. by the Illinois river; area, 500 sq. m.; pop. in 1870, 20,277. It has a rolling surface and a fertile soil, and contains an abundance of anthracite coal and timber. It is traversed by the Chicago and Alton railroad (Jacksonville division), and the Rockford, Rock Island, and St. Louis railroad. The chief productions in 1870 were 577,400 bushels of wheat, 1,051,313 of Indian corn, 64,029 of oats, 50,435 of potatoes, 195,992 lbs. of butter, 70,854 of wool, and 20,031 tons of hay. There were 9,034 horses, 4,479 milch cows, 13,146 other cattle, 13,690 sheep, and 31,690 swine; 12 manufactories of carriages and wagons, 6 of saddlery and harness, 3 of stone and earthen ware, 1 of woollen goods, 5 of bricks, 4 saw and 5 flour mills. Capital, Carrollton.

XIII. A W. central county of Iowa, intersected by Raccoon river; area, 600 sq. m.; pop. in 1870, 4,627. It consists mostly of prairies. It is traversed by the Chicago and Northwestern and the Des Moines Valley railroads. The chief productions in 1870 were 98,943 bushels of wheat, 226,965 of Indian corn, 54,967 of oats, 18,951 of potatoes, and 6,862 tons of hay. There were 1,774 horses, 1,300 milch cows, 2,966 other cattle, 3,875 sheep, and 5,852 swine; 1 flour mill, and 4 saw mills. Capital, Jefferson.

XIV. A S. W. county of Missouri, drained by branches of the Osage and White rivers; area, 750 sq. m.; pop. in 1870, 21,549, of whom 2,156 were colored. The surface is diversified and occupied by alternate forests and prairies. Limestone and lead are found. The soil is fertile. It is traversed by the Atlantic and Pacific railroad. The chief productions in 1870 were 171,166 bushels of wheat, 859,953 of Indian corn, 256,096 of oats, 47,626 of potatoes, 159,245 lbs. of butter, 37,491 of wool, and 4,487 tons of hay. There were 6,752 horses, 4,661 milch cows, 7,940 other cattle, 22,492 sheep, and 29,542 swine; 3 manufactories of agricultural implements, 3 of bricks, 1 of iron castings, 3 of carriages, 1 of engines and boilers, 2 of saddlery and harness, 2 of tobacco and snuff, 5 flour mills, 1 distillery, 1 planing mill, and 7 saw mills. Capital, Springfield.

GREENE, Christopher, an American soldier, born in Warwick, R. I., in 1737, killed near the Croton river, Westchester co., N. Y., May 13, 1781. He was among the first to take the field on the patriotic side after the engagements at Lexington and Concord. He served in the campaign in Canada under Arnold, and subsequently under Montgomery with the rank

of colonel, and was taken prisoner in the attack on Quebec, Dec. 31, 1775. On Oct. 22, 1777, while in command of Fort Mercer at Red Bank, on the Delaware, he sustained an attack from a large force of Hessians under Col. Donop, who were repulsed with great slaughter. For these services a sword was voted him by congress, which was presented in 1786 to his son, and a monument commemorative of the battle was erected in the neighborhood of Fort Mercer in 1829. Col. Greene lost his life in an encounter with a superior body of tory dragoons who had surprised his post. He killed several of the enemy with his own hand, but was finally overpowered.

GREENE, George Washington, an American author, born in East Greenwich, R. I., April 8, 1811. He is a grandson of Nathanael Greene, the revolutionary general. He was obliged by ill health to leave Brown university in his junior year in 1827, and resided from that time in Europe, with the exception of a few short visits home, till 1847. From 1837 to 1845 he was United States consul at Rome. Between 1835 and 1850 he published a series of essays in the "North American Review," which were collected in a volume entitled "Historical Studies" (New York, 1850). On his return to the United States he became instructor in modern languages in Brown university, and edited several text books, among which were a new edition of Pütz and Arnold's "Ancient Geography and History" (New York, 1849) and a "History and Geography of the Middle Ages" (1851). He furnished the life of Gen. Greene in Sparks's "American Biography," and afterward published separately a "Life of Nathanael Greene" (2 vols. 8vo, New York, 1867-8). In 1860 he published a volume of "Biographical Studies," in 1865 a "Historical View of the American Revolution," and in 1866 a criticism of the account of Gen. Greene in Bancroft's history. In 1872 he was appointed non-resident professor of American history in Cornell university.

GREENE, Nathanael, an American soldier, born at Potowhommet, Warwick co., R. I., May 27, 1742, died near Savannah, Ga., June 19, 1786. His father had a farm and a forge, and was a leading preacher among the Quakers. Nathanael was trained to manual labor, but picked up more than ordinary knowledge of history, geometry, law, and moral and political science. In 1770 he was chosen a member of the general assembly for Coventry, whither he had removed to take charge of another forge; and from that time he took an active part in public affairs till the close of the war. He was the first to establish a public school in Coventry, and for engaging in military exercises was expelled from the society of Friends. In 1774 he joined the Kentish guards as a private. In July of the same year he married Catharine Littlefield of Block island, and in May, 1775, was appointed by the general assembly to command as brigadier general the Rhode Island contingent in

the army before Boston. He joined his command at Roxbury on June 3, and from that time remained in active service without a day's furlough till the final disbandment of the army in 1783. At Boston his brigade was distinguished by its discipline, and he won the love and confidence of Washington from the beginning of their intercourse. After the evacuation of Boston he was intrusted with the defence of Long Island, but was stricken down by a fever a few days before the battle there. In September, 1776, he was made major general, and appointed to the command in New Jersey. At Trenton he led the division with which Washington marched in person, and with Knox was for following up the advantages of that brilliant surprise by advancing directly upon the other detachments of the enemy. He took an equal part in the battle of Princeton. At the Brandywine he commanded a division, and by a rapid march and successful stand preserved the army from destruction. At Germantown he commanded the left wing which penetrated into the village. On March 2, 1778, he accepted, at the urgent solicitation of Washington and the committee of congress, the office of quartermaster general, stipulating that he should retain his right to command in action. He held this position until August, 1780. At Monmouth, in 1778, he commanded the right wing. He took an active part in the attempt upon Newport, commanding the right wing in the battle of Tiverton heights. On June 23, 1780, he checked with two brigades and a small body of militia the advance of a corps of 5,000 of the enemy, in the brilliant battle of Springfield. He was in command of the army during Gen. Washington's visit to Hartford in September, 1780, when Arnold's conspiracy was discovered, and sat as president of the court of inquiry upon Major André. On Oct. 14 of the same year he was appointed to the command of the southern army, which he found on his arrival, Dec. 2, in a state of utter disorganization and want. On the 20th he advanced to a well-chosen camp on the banks of the Pedee, and began a series of operations which in less than a year stripped the enemy of nearly all their hard-won conquests in the Carolinas and Georgia, and shut them up in Charleston and its immediate neighborhood. The events of this year were the battle of the Cowpens, won by Gen. Morgan at the opening of the campaign; a brilliant retreat from the Catawba to the Dan; the return into North Carolina, in which Gen. Greene maintained his position for two weeks within striking distance of a superior enemy, in such a manner as both to avoid an engagement and cover the roads by which his reinforcements were coming; the battle of Guilford Court House, in which he lost the field, but gained the end for which he fought; the pursuit of Cornwallis to the Deep river; the daring advance into South Carolina; the battle of Hobkirk's hill, a second defeat followed by the results of victory; the

siege of Fort Ninety-six, raised by the advance of Lord Rawdon, but followed by the immediate evacuation of the post and the retreat of the enemy toward the west; the drawn battle of Eutaw Springs, the hardest fought field of the revolution; and the advance upon Dorchester, spoken of by Washington as "another proof of the singular abilities of" Gen. Greene. Congress presented him with a medal for the battle of Eutaw Springs, and two of the cannon taken from the enemy for his general services. The Carolinas and Georgia made him valuable grants of property. After passing a year in Rhode Island, he removed to Mulberry Grove on the Savannah river, where he died of sunstroke. A monument was voted by congress, but never erected, and all traces of his burial place have been lost. He left two sons and three daughters, and an estate seriously embarrassed by his efforts in 1783 to feed and clothe his army.

GREENE, I. Nathaniel, an American author, born in Boscawen, N. H., May 20, 1797. At the age of 12 he entered the office of the "New Hampshire Patriot" at Concord, and at 15 became editor of the "Concord Gazette." Removing to Portsmouth in 1814, he edited for a year the "New Hampshire Gazette." From 1815 to 1817 he conducted the "Gazette" at Haverhill, Mass. He commenced the publication of the "Essex Patriot" at Haverhill in May, 1817, and conducted it for nearly four years, when he removed to Boston, and established, Feb. 6, 1821, the "Boston Statesman," which became the leading democratic journal of the state. In 1829, on the election of President Jackson, Mr. Greene was made postmaster of Boston, which office he held till 1841, and again from 1845 to 1849. In 1836 he translated a "History of Italy" from the Italian of Sforzoli, which was followed by the translation of two volumes of "Tales from the German" (Boston, 1837). Six years later he published "Tales and Sketches from the French, German, and Italian." **II. Charles Gordon**, an American journalist, brother of the preceding, born in Boscawen, N. H., July 1, 1804. At an early age he was placed in the office of the "Essex Patriot" as an apprentice, whence he was removed to a printing office at Exeter. At 18 he went to Boston, and became connected with the "Statesman," his brother's journal. He conducted in 1825-'6 the "Free Press" at Taunton. Returning to Boston, he published a literary paper, the "Spectator," after which he resumed his connection with the "Statesman." In 1827 he removed to Philadelphia, where he was one of the conductors of the "National Palladium," the first Pennsylvania journal that advocated the election of Gen. Jackson to the presidency. In 1828 he was employed in the office of the "United States Telegraph," conducted by Gen. Duff Green, at Washington, then the principal journal of the democratic party. After the election of Jackson he succeeded

his brother Nathaniel as one of the proprietors and publishers of the "Statesman," of which he finally became sole proprietor. On Nov. 9, 1831, he issued the first number of the Boston "Morning Post." He has several times been a candidate for member of congress. He was naval officer at Boston from 1853 to 1857.

GREENE, Robert, an English dramatist and miscellaneous writer, born at Ipswich about 1560, died in London, Sept. 3, 1592. He was educated at Cambridge, and studied for a while also at Oxford. Although bred to a profession, he followed the career of an author, rivalling his brother dramatists, if not always in dramatic power, at least in profligacy. His life was spent alternately in plenty and penury. Being deserted by all his friends, he was indebted for shelter and attendance in his last sickness to a poor cobbler and his wife. He was a prolific writer, and in addition to his dramas, of which only five that are certainly his have come down to us, wrote poems, tales, and pamphlets. Some of his poems are characterized by much elegance of diction. His tale of "Pandosto, or the Historie of Dorastus and Faunna," furnished Shakespeare the plot for his "Winter's Tale." In "A Groat's Worth of Wit bought with a Million of Repentance," Greene alludes to Shakespeare as "an upstart crow beautified with our feathers—in his own conceit the only *shake-scene* in a country." An edition of his works was published by the Rev. A. Dyce in 1831 (2 vols. 8vo).

GREENFIELD, the shire town of Franklin co., Massachusetts, on the W. bank of the Connecticut river, 20 m. N. of Northampton, and 80 m. W. N. W. of Boston; pop. in 1870, 3,589. It is situated at the junction of the Vermont and Massachusetts with the Connecticut River railroad, and is connected with Albany and Troy by the Troy and Greenfield line, which passes through the Hoosac tunnel. It is supplied with water power by Green and Fall rivers, the latter of which forms part of the E. boundary. Besides the county buildings, it contains three manufactories of hardware for children's carriages, one of children's carriages, one of bolt-cutting machines, one of plumbs and levels, one of bench planes and ox shoes, a tannery, a carriage factory, and a sash and blind factory. The first manufactory of table cutlery in the United States was established here by John Russell in 1834, under the name of the Green River manufacturing company; destroyed by fire in 1836, it was rebuilt near Greenfield village, but within the limits of the town of Deerfield. The J. Russell manufacturing company of table cutlery was established in 1855; in 1870 its works were removed to Turner's Falls, a village on the E. bank of the Connecticut, 2½ m. from Greenfield, with which it is connected by a suspension bridge built in 1872. Greenfield contains two national banks with an aggregate capital of \$500,000, two savings banks with deposits amounting to \$3,500,000, four hotels, gas

works, water works, 10 public schools, including a high school, a young ladies' select school, a town library of 4,000 volumes, and seven churches, and has two weekly newspapers. The town was separated from Deerfield in 1753.

GREENHEART, a tree belonging to the laurel family and of the genus *neotandra*. Botanists do not agree as to the species, some calling it *N. Rodiei*, while others consider it a variety of *N. leucantha*. It is found in several of the West India islands and in various parts of South America, where it forms a large tree, often 50 or 60 ft. high and 2 or 3 ft. in diameter; the alternate polished leaves are from 4 to 9 in. long; the flowers, in loose panicles, consist of a wheel-shaped calyx, no petals, nine fertile stamens, and a single pistil; the divisions of the calyx fall away, and its tube remains as a small cup which supports the berry. The bark has been used as a substitute for cinchona, and, under the name of bibiru or bebeeru, has been somewhat employed in medicine. It contains an active principle called bebeerine, which is not to be confounded with berberine. The great value of the tree is in its timber, which is sent from Demerara to England, where from its hardness it is substituted in some cases for lignum vitæ; it is considered one of the most valuable timbers for ship building on account of its great strength and durability.

GREENHOUSE, a name commonly applied to any glass structure in which plants are raised, but by professional gardeners restricted to houses in which a comparatively cool temperature is maintained. A cool greenhouse is one intended simply to protect tender plants during the winter season, and the temperature may be as low as 35° or 40°; but plants are not expected to grow in such a house. Where flowers are desired, the day temperature must be at least 60°, with a minimum of 40° at night. Where a higher temperature than this is kept up, the house is called a stove, and is heated to 70° or 80° or more, according to the character of the plants it contains. A conservatory is a greenhouse attached to a dwelling, and is designed more for the effective display of plants than for raising them. Houses for special cultures are graperies, ferneries, orchard houses, orchid houses, &c. In designing a greenhouse, light, heat, air, and water have to be considered. The simplest form of a greenhouse is a "lean-to," in which the back is formed by its being placed against some other building, a fence or a wall erected for the purpose. The roof slopes at an angle of 45° from the back wall to the front one, which is usually provided with a row of lights between the bench upon which the plants are placed and the plate upon which the roof rests. The span-roofed house, being intended to receive light upon all sides, usually stands apart from other buildings; its roof is straight or curvilinear, and its height and other dimensions are governed by the kind of plants for which it

is intended; houses of this kind are frequently made ornamental by means of architectural embellishments. Large houses are often built with a central dome and span-roofed wings, and some are built with a half span, one portion of the roof being shorter than the other. In commercial establishments, where the greatest economy is studied and little regard is paid to appearances, the houses are usually low span-roofs. Sashes 6 ft. long are used for the roof; these meet above on a central ridge pole, and rest below on a plate which has its upper surface hollowed to form a water conductor. An excavation is made deep enough to allow head room beneath the glass, and walled up with brick to a foot or two above the surface of the ground. Such houses are about 11 ft. wide, with a bench 4 ft. wide upon each side and a central path of 3 ft. This brings the plants upon the benches near to the glass, the position most favorable to growth, and gives sufficient room to work in; as the plants are intended to be sold while small, less space is required than in houses for other purposes. Heating was formerly accomplished entirely by means of flues running the whole length of the house, crossing the end, and returning upon the other side, the furnace being in a pit and accessible from the outside. This method of heating is sometimes still employed, as the outlay is less than in any other plan. The flue is sometimes built of brick its whole length, or is of brick for a few feet nearest the furnace, while the remainder is of pipes of earthenware or cement. The disadvantages of flues are the danger from leaks which may allow injurious gases to escape, and the difficulty of heating all parts of the house equally. On these accounts heating by means of hot water is preferred. There are numerous styles of greenhouse boilers, but they are all built upon the same principle, viz.: a reservoir of water with a pipe beginning near its upper portion, running the whole length of the house, and returning to the boiler, which it enters near its lower part. When a fire is lighted under the boiler, the water immediately begins to circulate, the lighter warm water passing out by the upper outlet, through the pipe, and returning to it through the inlet. In its passage through the pipes it gives off its heat by radiation, and with a well constructed apparatus the heat will be evenly distributed. At the end of the house furthest from the boiler is the expansion tank, an upright iron cylinder of somewhat larger diameter than the heating pipes; the flow and return pipe are both connected with this, which is open at the top or loosely covered; this prevents the expansion of the water when heated from exerting any pressure upon the pipes, and allows the air liberated from the water to escape, as well as any steam that may be formed when the apparatus is working to its fullest capacity. There is much difference in the internal construction of the boilers, each inventor striving

to expose the greatest possible heating surface to the action of the fire. To economize heat, a flue to carry off the products of combustion from the boiler is sometimes run through the house. Ventilation is accomplished in various ways: in small houses by lifting or sliding the sashes, and in large ones by raising a portion of the upper part of the roof by proper machinery. A water cistern is generally built under the floor of the greenhouse, into which the water from the roof is conducted. Shading is required as spring approaches, which is commonly accomplished by washing the glass with ordinary lime wash, or with whiting and milk; in some cases a screen of muslin is used, or a lattice work of narrow strips of wood.—For the construction and management of commercial greenhouses, Henderson's "Practical Floriculture" may be consulted. "Choice Stove and Greenhouse Plants," by B. S. Williams, is one of the most recent English works; and the amateur will find useful hints in "The Greenhouse as a Winter Garden," by F. E. Field.

GREEN LAKE, a S. E. county of Wisconsin, intersected by Fox river; area, 360 sq. m.; pop. in 1870, 13,195. Green and Pacawa lakes, each about 9 m. long, are in the county. The surface is undulating and the soil productive. The chief productions in 1870 were 614,247 bushels of wheat, 17,702 of rye, 251,822 of Indian corn, 300,814 of oats, 18,416 of barley, 11,800 of buckwheat, 91,343 of potatoes, 362,598 lbs. of butter, 119,214 of wool, 32,551 of hops, and 29,628 tons of hay. There were 4,108 horses, 4,353 milch cows, 5,403 other cattle, 31,501 sheep, and 4,659 swine; 3 manufactories of boots and shoes, 15 of carriages, 3 of cheese, 5 of clothing, 3 of barrels and casks, 4 of furniture, 1 of woollen goods, 1 saw mill, and 10 flour mills. Capital, Dartford.

GREENLAND (Dan. and Ger. *Grönland*; Fr. *Groënland*), an extensive region belonging to Denmark, lying N. E. of the mainland of North America, from which and its outlying islands it is separated by Davis strait, Baffin bay, and the northward extensions of the latter, known as Smith sound, Kennedy channel, and Robeson strait; pop. in 1871, 9,825. Cape Farewell, its S. extremity, is a point on a small island, in lat. 59° 49' N., lon. 43° 54' W., from which the E. coast extends N. E. to Cape Brewster, lat. 70°, where it takes a more northerly course and stretches toward the pole to an unknown distance. The S. part of this coast is washed by the Greenland sea, a portion of the N. Atlantic, and the N. part by the Arctic ocean. Iceland, which is distant about 160 m., is separated from it by Denmark strait. The W. coast pursues a N. N. W. direction to Cape Alexander, its westernmost extremity, about lat. 78° 10', lon. 73° 30', where it turns N. E. and extends beyond lat. 82°. According to the report of two of the crew of the *Polaris*, it terminates about lat. 83°, and trends thence E., thus indicating the insularity of Greenland. A channel about 60 m. wide, running E. and

W., is said to have been seen on the north, and beyond it the lofty hills of a polar land. The E. coast is practically inaccessible on account of the drift ice, which, borne S. by the polar current, sometimes fills the entire sea between it and Iceland, and forms a barrier around Cape Farewell extending more than 100 m. seaward. The outline of this coast is rugged and barren, with cliffs and lofty precipices which are visible far out at sea. A number of inlets, the principal of which are Scoresby and Davy sounds, extend an unknown distance into the interior. Henry Hudson explored this coast in 1607, in an attempt to make the N. W. passage, and named a cape in lat. 73° 30' Hold with Hope. It was visited by Scoresby in 1822, Clavering and Sabine in 1823, Graah in 1829 and 1830, and Hegeman in 1870, all of whom confirm the accounts of its ruggedness and inaccessibility. The W. coast is better known. It is generally rocky and high, but sometimes flattens into low valleys, penetrated by numerous inlets and fiords, some of which extend far inland. Into most of these come down glaciers from the great glacier which appears to cover the whole interior. About lat. 70° is Disco island, lying in the mouth of Disco bay, and numerous smaller islands line the entire coast. Melville bay is a large and wide indentation, usually filled with floating ice. Its N. shore is formed by Hayes peninsula, into which makes Wolstenholme sound. Inglefield gulf is the next indentation, N. of which lies Prudhoe land. In the W. extremity of this is Lifeboat cove, the winter quarters of the *Polaris* in 1872-'3. Further N. is the great Humboldt glacier, which extends over almost an entire degree of latitude, between lat. 79° and 80°. The whole coast here is a *mer de glace* formed by the crowding toward the sea of the glaciers, which, raised finally by the water beneath, break off with loud detonations, and floating free become icebergs. This is one of the principal sources of the icebergs of the N. Atlantic. Next is a peninsula called Washington land, with South fiord on its N. side, an inlet opening into Hall basin and extending far inland. Above Hall basin is Robeson strait, first explored in 1871 by Capt. Charles F. Hall, who named the several harbors along the coast *Polaris* bay, *Thank God* bay, *Newman* bay, and *Repulse* harbor. In *Thank God* bay, lat. 81° 38', the *Polaris* made her winter quarters in 1871-'2. Dr. Pingel, a Danish naturalist, has established the fact that the W. coast from lat. 60° to 70° is gradually sinking at the rate of several feet in a century. At numerous places are submerged ruins, some not more than 75 years old, and the present Greenlanders avoid building near the water's edge. The interior is buried under a colossal mass of ice, which conceals all the minor ridges and valleys, and permits but a few steep mountains to protrude. This ice is continually moving seaward, a very small part of it eastward and the rest westward. The greatest discharge

is through the large friths, down which the ice moves in masses several miles wide, until, reaching deep water in Baffin bay, it breaks up and forms icebergs. Rink counted 22 great ice streams on the coast, indicating as many concealed valleys. Large streams of muddy water pour out from under the ice, even when it is 2,000 ft. thick, showing that a powerful grinding action is going on upon the surface of the rocks beneath.—The rocks of the coast are chiefly granite, gneiss, porphyry, slate, and calcareous formations. On the E. coast Scoresby found the slates of the coal formation, containing impressions of extinct species of tropical plants, like those of the same strata in more southern latitudes. Good coal is mined in abundance on the island of Disco, and at various places on the mainland are found silver, copper, iron, tin, lead, zinc, plumbago, arsenic, molybdenum, and other metals. The Swedish scientific expedition of 1871 found immense masses of meteoric iron on the coast, between the ebb and flow of the tide. One specimen weighing 49,000 lbs. Swedish, with a maximum sectional area of 42 sq. ft., is now in the royal academy at Stockholm, and another of 20,000 lbs. in the museum of Copenhagen. They contain 5 per cent. of nickel and from 1 to 2 per cent. of carbon. Asbestos, serpentine, zircon, gadolinite, tourmaline, iolite, rock crystal, and garnets also occur; but the only mineral exported is cryolite, from the mine at Iviklut, on the fiord of Arsut. About 100 miners are employed, and the annual product is from 10,000 to 12,000 tons, one half of which is sent to Denmark and the remainder to the United States, where it is made into commercial soda by the Pennsylvania salt company. A royalty of 20 per cent. is paid to the Danish government; and as the season of working is short and the navigation of the fiord is attended with danger on account of icebergs, the mine yields but little profit.—The climate is considered healthy by the Danes, and in S. Greenland is less rigorous than the high latitude and the immense fields of ice would indicate, the cold being greatly modified by the sea. On the E. coast the mean temperature is below the freezing point, but it is milder on the W. coast. Further N. the cold is intense, exceeding that of corresponding latitudes in Lapland. According to Dr. Hayes, the mercury stood at -68° F. in March, 1861, in lat. $70^{\circ} 30'$ N.; but in 1871 Capt. Hall found a much milder climate at his winter quarters in lat. $81^{\circ} 38'$; the plain surrounding Thank God bay was free from snow in June, and the ground was covered with herbage, on which numerous herds of musk oxen found pasture, and rabbits and lemmings abounded. The wild flowers were brilliant, and large flocks of birds flew northward. This would indicate either an exceptional season, or that the climate is less rigorous toward the pole. Generally the winter cold is interrupted by thaws, which last sometimes for weeks. Through June and

July the sun is constantly above the horizon. The earth begins to thaw in June, and in July the ice is melted away in the southern fiords, and small streams, flowing from the interior, feed a few unimportant lakes, which remain open for a brief season. But even in the heat of summer ice can always be found a short distance below the surface of the ground. Permanent springs are almost unknown, but Dr. Kane found one at Godhavn, Disco, which had a winter temperature of 83° F., and Giesecke speaks of a thermal spring which maintained a temperature of 104° . The heat of the long summer day evaporates the water left by the tide in the hollows and clefts of the rocks and leaves a fine salt. Fogs prevail from April to August. Little rain falls, especially in the north. Gales are infrequent, but in the autumn they rage sometimes for days with great fury. There is occasional lightning, but no thunder. The aurora borealis is often seen in winter, frequently so bright as to cause the stars to disappear, and mirage is common on the coast.—The vegetation is slight, but it exceeds that of high mountainous districts in warmer latitudes. Dr. Hooker noted that most of the 320 phænogams and vascular cryptogams which make up the flora of Greenland were of Scandinavian origin, and that few American types were found, notwithstanding the comparative nearness of the continent. A few additional species have since been discovered. Mosses, lichens, and a few grasses and stunted plants and shrubs grow even in the far north, and furnish food for the reindeer, bear, and musk ox. Dr. Hayes noticed at Prøven, among other flowers, the golden-petalled poppy (*papaver nudicaule*), the dandelion (*contodon palustre*), the buttercup (*ranunculus nivalis*), the saxifrages, purple, white, and yellow, the *potentilla*, the purple *pedicularis*, and the *andromeda*. In sheltered places the pine, alder, and birch attain a height of barely 6 ft. and a stem of but 3 or 4 in. in thickness, and the willow becomes little more than a running vine. The scant soil is so full of fibrous roots that when cut and dried it is used for fuel. Attempts to raise oats and barley are unsuccessful, but potatoes are grown in the south. Turnips attain only the size of pigeons' eggs, and cabbages are very small. The radish is the only vegetable that is unchecked in its growth.—The seas around Greenland abound with animal life. The great rorqual whale, which attains sometimes a length of 120 ft., the more valuable mysticetus, or true whale, and other varieties, make them their resort. The walrus, the narwhal, the porpoise, and the seal are found on all the coasts. The arctic shark (*squalus borealis*) abounds, and is taken for the sake of the oil extracted from its liver, which is preferred to the best seal oils. Smaller fish are found in all the bays, and various kinds of crabs and shrimps exist in great numbers. Sea fowl in vast flocks frequent the coast, among them the little auk, guillemot, petrel, gull,

goose, and duck. There are traditions of the great auk, but it has not been seen by late explorers. The eider duck visits the most northern shores in the spring and raises its young. Other birds often seen are the raven, ptarmigan, grouse, tern, sandpiper, plover, dovekie, and snow bunting. In the more northerly parts the polar bear and the musk ox are found, but they are seldom seen in the south, excepting in severe winters, when it is difficult to paw the snow from the scant vegetation. In summer the bears live upon seals, which they catch on the ice. The reindeer, once abundant, are becoming scarce on the coast, the natives having hunted them with great persistency since the introduction of rifles; it is said that at least 10,000 have been killed in the past 30 years in the district of Omenak. Two species of fox, the white and the blue, abound. The skins of the blue fox are much sought after, the fur commanding a high price. The domestic animals are sheep, a few cattle, and dogs, the last of which constitute the chief wealth of the Greenlanders, who train them to draw sledges. They relapse sometimes into the savage state and roam in packs, hunting the reindeer.—With the exception of about 300 Europeans, mostly Danes, the population is composed entirely of Esquimaux, who live by hunting and fishing. A few live on the E. coast, below lat. 65°, but all the villages and settlements are on the W. coast, upon the low lands along the fiords. After years of discouraging effort on the part of the missionaries, all the natives have been converted to Christianity. They have given up their nomadic habits and enjoy the benefits of civilization, while they are afflicted with fewer of its vices than are the Indians who have come in contact with the white man elsewhere. Liquor is prohibited in all the settlements, and it is only once a year, on the king's birthday, that every man in Greenland is permitted to receive from the government storehouses a glass of schnapps, to drink the health of his sovereign. For administrative purposes the country is divided into two inspectorates, North and South Greenland. North Greenland is subdivided into seven districts, Upernavik, Omenak, Ritenbenk, Jacobshavn, Godhavn, Christianshaab, and Egedesminde, the last being the most southerly. Godhavn (Good Harbor), on the S. side of the island of Disco, in lat. 69°, has a population of 250, and is the residence of the inspector. The districts of South Greenland are, beginning with the most northerly, Holsteinborg, Sukkertoppen, Godthaab and Nye Herrnhut, Lichtenfels, Frederikshaab, and Julianeshaab. Godthaab, in lat. 64°, the residence of the inspector, has a population of 740. Each of these 13 districts has a director (*colonibestyrrere*), who is assisted in his administrative duties by a parliament chosen from the principal men. Julianeshaab, the chief district, comprises all the coast from Cape Farewell to lat. 61°. The town is in lat. 60°

44', on the fiord of Igalliko, a large inlet from the sea, from 2 to 5 m. in width, which is so shut in by the mountains that no glacier finds its way into it. Along its banks are still to be seen the ruins of the ancient Norse settlements. The town has a population, according to some authorities, of 2,600, but according to Dr. Hayes of only 800. The settlements of Nye Herrnhut, Lichtenfels, Frederiksdal, and Frederikshaab belong to the Moravian missions. The rest of the coast is in charge of the Lutheran missions, which are under the direct patronage of the government, and are administered by a board appointed by the Danish crown. The Moravians depend for their supplies upon private negotiations and the courtesy of Danish vessels.—The whole trade of Greenland is a monopoly of the crown of Denmark, and is carried on under the direction of the Greenland trading company (*Kongelige Grønlandske Handel*), an association founded in 1781, and controlled by a directory in Copenhagen. Each settlement is presided over by an agent, either a Dane or a half-breed, who keeps the company's accounts, disposes of stores, and gathers products. The stores are brought annually from Denmark to Julianeshaab, whence they are distributed to the various outposts. The chief exports from Greenland are stock fish (cod dried without salt), the skins of the seal, fox, and reindeer, whale and seal oil, blubber, eider down, and cryolite. The imports are grain, coffee, sugar, tobacco, brandy, and firewood. The expenses are so great that the trading company pays but a small sum annually into the royal treasury.—Greenland was discovered by the Northman Gunnbjörn, who saw its E. coast in 876 or 877; but he was wrecked on the rocks afterward called by his name, and did not land upon it. In 983 Eric the Red (so called from the color of his hair), son of a jarl of Jadar in Norway, set sail from Bredifjord, Iceland, in search of the land seen by Gunnbjörn, of which a tradition still lingered in Iceland. He doubled Cape Farewell and sailed up the W. coast to the present site of Julianeshaab, where he saw large herds of reindeer browsing on the meadow lands. The country pleased him, and he named it Greenland, and the inlet Ericsfjord. In 985 Eric returned to Iceland, and again set sail with 25 ships loaded with emigrants and the means of founding a colony. He reached Ericsfjord with 14 of these ships, the rest having been lost by the way or forced to put back, and built a settlement far up the fiord. The town grew and prospered, and in time the coast was explored and new plantations were founded. How far N. the Norsemen penetrated is not known, but an inscribed pillar, erected in 1135 on one of the Woman's islands on the E. shore of Baffin bay, and found there in 1824 by Sir Edward Parry, proves that one of their expeditions went as far as Upernavik, lat. 72° 50', and "cleared ground" there. As no trees grow in that region now, it is probable that the land was then

far more habitable than at present. The early chroniclers, too, make very little mention of ice, and there are evidences that the soil bore more generously in those days. Eric found no indigenous race, and he and his followers became the sole tenants of the land. The several settlements around Ericsfiord were called collectively Östre Bygd (East country), and the more northerly plantations Westre Bygd (West country). At one time there were more than 300 farms and villages between Disco and Cape Farewell. Churches and monasteries were built, and in the 12th century Greenland was erected into a bishopric, it having been previously a dependency of the see of Iceland. Seventeen successive bishops held the see of Gardar, the last of whom was consecrated in 1406. No Esquimaux (Skralinger) are mentioned by the chroniclers until the 14th century, when Thorwald saw them on the coast of Labrador. Toward the middle of this century a horde of Skralinger appeared on the borders of the Westre Bygd, and 18 Norsemen were killed in an encounter with them. When the news reached the Östre Bygd in 1349, Ivar Beer went with a force to the rescue; but he found only the ruins of the colony. Toward the close of the 14th century Greenland was visited by Nicolò Zeno, a Venetian navigator. In 1409 the bishop's see was abandoned. A letter from Pope Nicholas V. to the bishop of Iceland, written in 1448, mentions the descent of a hostile fleet on the coast about 30 years before, which laid waste the country with fire and sword, so that the organization of the colonies was destroyed; and we hear no more of Greenland until the time of the Elizabethan navigators. In 1576 Martin Frobisher, sailing in quest of a N. W. passage to China, came in sight of the E. coast in lat. 61°, and rounded Cape Farewell. Other navigators followed, and attempts were made to recover the lost colonies during the succeeding century; but it was not till 1721, when the Danish missionary Hans Egede established himself at Godthaab, that any success was attained. The Moravian missions were founded soon after, and the settlements have since continued to grow. Even the sites of the ancient colonies were unknown until a recent period. In 1829 the king of Denmark sent an expedition under Capt. Graah to determine the site of the Östre Bygd, which was supposed to be on the E. coast, the ruins at Igalliko fiord being taken for those of the Westre Bygd. He found reasons for believing that both settlements were on the W. coast, and within a few years it has been demonstrated beyond a doubt that Igalliko fiord, or Ericsfiord, was the site of Eric's long lost colony.

GREENLEAF, Simon, an American jurist, born in Newburyport, Mass., Dec. 5, 1783, died in Cambridge, Oct. 6, 1853. He practised law in Massachusetts and afterward in Maine, was reporter of the supreme court of Maine from 1820 to 1832, and during this period published nine volumes of reports, and a treatise on the

"Origin and Principles of Free-Masonry" (Portland, 1820). In 1833 he became professor of law in Harvard university, and held this office till 1848. In 1840 he published a volume of "Overruled, Denied, and Doubted Decisions and Dicta," which was expanded in subsequent editions to three volumes. In 1846 he published an "Examination of the Testimony of the Four Evangelists, by the Rules of Evidence as administered in Courts of Justice, with an Account of the Trial of Jesus." In 1849 he published an edition of Cruise's "Digest of the Law of Real Property." But his great work was a "Treatise on the Law of Evidence" (3 vols., 1842-'53).

GREEN MOUNTAINS, the northernmost portion of the Appalachian chain, extending from Canada S. through Vermont. To this state, over which they are largely spread, they give its name, from the term *monts verts* by which they were known to the early French settlers. The continuation of the range through Massachusetts and Connecticut is also known to geographers as the Green mountains, but by the inhabitants of these states other names are applied to them; as the Hoosac mountains in Massachusetts for that portion lying between the Connecticut and Housatonic rivers, and constituting the most elevated portion of the state, and the Taconic mountains for the western part of the range, along the New York line. These ranges extend into Vermont near the S. W. corner of the state, and join in a continuous line of hills, that pass through the western portion of the state nearly to Montpelier. Without attaining very great elevation, these hills form an unbroken watershed between the affluents of the Connecticut on the east and the Hudson and Lake Champlain on the west, and about equidistant between them. South from Montpelier two ranges extend, one N. E. nearly parallel with the Connecticut river, dividing the waters flowing E. from those flowing W.; and the other, which is the higher and more broken, extending nearly N. and near Lake Champlain. Through this range the Onion, Lamoille, and Missisque rivers make their way toward the lake. Among the principal peaks are Mt. Mansfield, 20 m. N. W. of Montpelier, 4,279 ft. above the sea; Camel's Hump, 17 m. W. of Montpelier, 4,188 ft.; Killington peak, near Rutland, 3,924 ft.; and Acutney, in Windsor co., near the Connecticut river, 3,320 ft.—This portion of the Appalachian chain neither possesses the marked uniformity of elevation and parallelism of its ridges that characterize the same chain further S., nor has it the abruptness and precipitous outlines of the granitic summits of the White mountains. The body and eastern side of the Green mountain range is generally of primitive geological structure, consisting of hornblende, granite, gneiss, &c. The rocks of the western slope are principally old red sandstone, containing iron ore and manganese. The general range of the rocks is about N. 15° E., with a prevailing dip

of 30° to 55°, and sometimes more, toward the east. These give a comparatively smooth outline to the surface of the hills; and though the soil they produce is not generally fertile, the slopes are covered on the disappearance of the snow with fine pastures of rich green grass, which may have given the mountains their name, though this is commonly referred to the growth of evergreen forest trees, which abound upon the poorer lands and along the margins of the streams. Upon the better lands is found the hard-wood growth of beech, birch, sugar maple, white oak, ash, &c. The mineral products of the Green mountains are very valuable, including excellent iron ores, manganese, marble, slate, &c. (See VERMONT.)

GREENOCK, a parliamentary borough and seaport town of Renfrewshire, Scotland, on the S. shore of the estuary of the Clyde, 18 m. W.

N. W. of Glasgow; pop. in 1871, 57,138. It stands partly on a narrow plain, and partly on the declivity of a high hill. It has about 35 churches and chapels, a Latin school, a town library of 12,000 volumes, a mechanics' hall, excellent docks and wharves, and in the neighborhood an aqueduct 3 m. long. There are numerous sugar refineries and iron foundries, considerable ship building, in particular of iron ships, and manufactories of sail cloth, shoes, soap, and candles. The entrances at the port in 1871 were 64 steamers and 562 sailing vessels; the clearances, 22 steamers and 339 sailing vessels. The imports were valued at £6,117,796 (from the United States, £53,453); the exports at £649,313 (to the United States, £63,521). All the steamers of the Clyde touch at this port. The Victoria dock, opened Oct. 17, 1850, is a tidal basin covering an area of six



Greenock.

acres, and exceeding 30 ft. in depth; it cost upward of £120,000.—Until 1697 Greenock was a small fishing village. James Watt, the inventor of the steam engine, was a native of the town, and in 1838 a marble statue by Chantrey was erected to him here.

GREENOUGH, Horatio, an American sculptor, born in Boston, Sept. 6, 1805, died at Somerville, near Boston, Dec. 18, 1852. A French sculptor named Binon, resident in Boston, was his first master; and he enjoyed the friendship and advice of Washington Allston. Before completing his college course he went to Rome, where he arrived in the autumn of 1825. He returned to Boston in 1826, and after modeling busts of John Quincy Adams, Chief Justice Marshall, and others, returned to Italy and settled in Florence. His first commission was from James Fenimore Cooper, for whom he executed his "Chanting Cherubs." In 1831 he went to Paris to model the bust of Lafayette, and after his return to Florence received liberal commissions from his countrymen, principally for busts. To Cooper he was indebted for the commission from congress to execute his colossal statue of Washington, which was

finished in 1843, after many years' labor. During this time he executed, among other original works, the "Medora" for Mr. Gilmore of Baltimore, the "Angel Abdiel," and the "Venus Victrix" in the gallery of the Boston Athenæum. A second commission from congress employed him for some years subsequent to this, and in 1851 he returned to the United States to superintend the placing in Washington of his group of the "Rescue." Many vexatious delays prevented the arrival of the work from Italy, and Greenough was attacked by brain fever soon after he had commenced a course of lectures on art in Boston, and died after a short but severe illness. At his death he had sketches of work for 20 years. A "Memorial of Horatio Greenough," published in 1853, contains a collection of his papers on art and other subjects, preceded by a life of the artist by H. T. Tuckerman.

GREENPORT, a village and port of delivery in the town of Southold, Suffolk co., N. Y., on the S. side of the N. E. point of Long Island, 95 m. E. N. E. of New York; pop. in 1870, 1,819. It has an excellent harbor at the entrance to Peconic bay, capacious enough for

the largest ships, and seldom obstructed by ice. Coasting vessels are owned here, and there are several ship yards. The village contains seven churches, two newspaper offices, a stereotype foundry, a national bank, a public school, and four large hotels. It is the E. terminus of the Long Island railroad. Great quantities of oil are manufactured in floating and stationary factories, from menhaden or bunkers. Torpedo fireworks are extensively made, chiefly by Germans and their children. For a few years past Greenport has been rapidly rising in importance as a summer resort and watering place, on account of its superior facilities for boating, fishing, and bathing. A large hotel was erected on the S. side of the bay in 1872, and a still larger one has lately been completed near by. In summer there are steamboat lines to New York, New Haven, and Newport.

GREEN RIVER. I. A considerable stream which rises in Lincoln co., Ky., flows W. past the Mammoth cave, and, after receiving Big Barren river, bends N. W. and enters the Ohio 9 m. above Evansville in Indiana; length, nearly 300 m. It is 200 yards wide at its mouth, and in the lower part of its course is navigable by steamboats at all seasons, while, by means of dams and locks, small steam vessels can ascend to Greensburg, a distance of 200 m. The upper part of its valley is occupied by cavernous limestone, and the lower abounds in coal. II. One of the constituents (properly the upper continuation) of the Colorado of the West. It rises in the Rocky mountains near Fremont's peak, in the W. part of Wyoming territory, in about lat. $43^{\circ} 15' N.$, lon. $109^{\circ} 45' W.$, flows S., turns S. E. through the N. E. corner of Utah, entering the N. W. corner of Colorado, then bends S. W. and reenters Utah, and afterward pursues a general S. course to its junction with the Grand. Its entire course is about 500 m. Besides numerous affluents which it receives in Wyoming, the principal tributaries are the Yampah or Bear and the White from the east, and the Uintah, White, Little White, and San Rafael from the west. Green river for the greater part of its course flows through deep and precipitous cañons. It first enters the Uintah mountains in the extreme N. W. corner of Colorado, at a point called Flaming Gorge, just below which the walls of the cañon are nearly 1,500 ft. high. The stream is swift, the descent being in places 20 ft. to the mile. Rapids and cataracts, some of them of great height, are frequent. There is generally on the one side or the other a narrow strip of land forming the valley of the river, but for considerable distances the walls rise perpendicularly from the water's edge to the height of 5,000 or 6,000 ft., and at one point of 6,500 ft.

GREENSAND, an important member of the cretaceous group of stratified rocks. In Europe it is found in both divisions of these rocks, the upper and lower, the clay called gault being intermediate. The chalk overlies the greensand; and the Wealden clays, where they appear at

all, separate it from the next inferior group, the oolite. In the United States, the greensand is not found throughout the range of the cretaceous group around the southern termination of the Alleghanies and thence west. It is indeed little known except on its range through New Jersey. The tract it occupies, commencing at the N. E. on Sandy Hook bay, extends S. on the coast to Shark inlet, giving a width across the Atlantic outcrop of the formation from N. W. to S. E. of about 18 m. Its length is directed S. W. across the state, the tract gradually growing narrower and terminating in a point at Salem, opposite the N. part of Delaware. Its N. line approaches within $1\frac{1}{2}$ m. of the Delaware at Bordentown, and is but little further back from it a few miles below Camden, opposite Philadelphia. The dip of the formation is toward the S. E. at a small angle. On this side its uppermost strata disappear beneath the sands which cover the country; and on the N. W. come up from beneath its lowest beds the clays, well known at Amboy and other points on their range toward the S. W. for their use in pottery and the manufacture of fire brick. A straw-colored limestone, which occasionally appears overlying the greensand on its S. E. margin, calls to mind by its position and the numerous marine fossils it contains the calcareous strata of Europe known as the chalk. The whole thickness of the strata known as greensand is about 100 ft., but one principal bed is recognized among the other strata of sand and clays and intermixed greensand, which is about 30 ft. thick. This is in great part, sometimes wholly, made up of small round dark granules; several are often united in one, and a quantity of them moistened may sometimes be kneaded like clay. The grains are commonly of deep green color, sometimes bluish, and sometimes a dark chocolate; but whatever their external color may be, they are all bright green when well washed, and especially when crushed. Clay and white silicious sand are commonly intermixed in variable proportions with the greensand. In some places fossil shells and other marine organic remains abound in the greensand, being grouped together in layers a few feet in thickness. The species are numerous and often beautifully preserved. This is especially the case with those found in the overlying yellowish limestone; all are extinct. Of 60 shells collected by Lyell, 5 proved to be identical with European species, viz.: *ostrea larca*, *O. vesicularis*, *gryphaea costata*, *pecten quinquecostatus*, *belemnites mucronatus*. Prof. Forbes regarded 15 of the 60 "as good geographical representatives of well known cretaceous fossils of Europe." Besides these organic remains are found teeth and vertebrae of sharks and some other fishes, also teeth and other vestiges of crocodiles and several other saurians, some of gigantic size, one of the largest of which, the *hadrosaurus Faulkii*, has been restored from a few bones by Prof. B. Waterhouse Hawkins, and is now deposited in the museum of the Philadelphia academy

of science. Remains of several crustaceous animals, as crabs, are also met with, and finely preserved specimens of various species of the echinodermata, and of zoöphytes, sponges, &c. The shells which most abound in the greensand, occasionally making up the principal portion of the layers in which they occur, are gryphæas, terebratulas, ostreas, belemnites, and the *exogyra costata*, the last named a very common and large bivalve peculiar to the cretaceous group.—The greensand is of importance for its fertilizing property; and this is found to be derived, not from the calcareous nature of its organic remains, but from the green grains which commonly make up the greater portion of its beds. These, as they are found in New Jersey, when separated from adhering sand and clay, present a composition varying only within a limited range, and not differing from that of the greensand near Havre, France, as determined by Berthier. But according to the analysis of Dr. Turner, the same mineral substance of Kent, England, is deficient in the very element, potash, to which its valuable qualities in this country are essentially owing. Some of the same material also met with in Marshfield, Duxbury, and Gay Head, Mass., resembles the English in this particular. The mean of four analyses of New Jersey greensand, made by John C. Smock and E. H. Bogardus in 1865-'8, and the result of the examination of foreign specimens, are given in the following table:

CONSTITUENTS.	N. J.	France.	Gay Head.	England.
Silica.....	48.50	50.00	56.70	48.50
Potash.....	9.00	10.90	.....	.....
lime.....	1.50	.....	1.62	.....
Alumina.....	8.00	7.00	13.82	17.00
Protoxide of iron.....	5.00	21.00	20.10	22.00
Peroxide of iron.....	21.00	.....	.....	.....
Water.....	9.00	11.00	7.00	7.00
Magnesia.....	.....	.....	1.18	8.80

In New Jersey the greensand (there called marl) is dug from pits during the winter, and brought out upon the fields, where it is spread to be ploughed in. The effect is experienced with the first crop, and continues for several years.—The investigations of Ehrenberg first showed that many of the greensand grains are casts of the microscopic shells of *polythalamia* (the many-chambered) and of other organic bodies. The shells themselves had disappeared; but the internal form of their cavities was retained in the more durable silicate of iron, which took the place of the animal bodies as these decayed, and preserved their shapes. Even the very finest canals of the cell walls, and all their connecting tubes, are thus petrified and separately exhibited. Many of the grains which cannot be recognized as of this origin still suggest some connection with animal bodies by their forms being sometimes lobed and again presenting the appearance of coprolites. Prof. Bailey by his experiments confirmed the conclusions of Ehrenberg, and, extending his investigations to cretaceous rocks

from Alabama and W. Texas, found attached to them grains of greensand exhibiting the same phenomena. From specimens of marl and limestone of the eocene of the southern states he also succeeded in bringing to light similar grains of the same character by dissolving away with dilute acid the calcareous matters. One of his specimens was brought up in sinking the artesian well at Charleston from the depth of 140 ft. The soundings of the coast survey brought up from the depths of the ocean, in the Gulf stream and the gulf of Mexico, something resembling greensand. Count Pourtales reports one sounding as of this character obtained in lat. 31° 32', lon. 79° 35', at the depth of 150 fathoms. This, as well as the others referred to, were examined by Prof. Bailey, who found them to be greensand, and that this is often in the form of well defined casts of *polythalamia*, minute mollusks, and branching tubuli. The material he found to be the same as that of the fossil casts; but the chief part of the soundings he found consisted of perfectly preserved shells of the same species, which retained their brilliant colors, and gave evidence by treatment with acid that the soft parts were still present, thus proving the recent existence of the animals. Hence it appears that in some deep seas the production of greensand is still going on, and formations of this obscure material are there growing up by the same agencies which elaborated those of ancient geological periods.

GREENSBORO, a town and the capital of Hale co., Alabama, 80 m. W. by N. of Montgomery; pop. in 1870, 1,760, of whom 972 were colored. It is surrounded by large cotton plantations, has a flourishing trade, and contains a court house, a jail, two banks, and several churches, and has a weekly newspaper. It is the seat of the Southern university (Methodist), which in 1872 had 13 professors and instructors, 120 students, and a library of 10,000 volumes.

GREEN SNAKE. See COLUBER.

GREENSTONE, a trappean rock of granular texture, either crystalline or compact, composed of hornblende and orthoclase, or augite with either orthoclase or albite. When albite replaces orthoclase, the rock is called diorite. Its greenish color is due to minute quantities of chromium compounds. It is called trap when in columnar form. Basalt is essentially the same rock. Being of irregular fracture, too hard to cut, and lacking uniform grain, it is unfit for use in building except of rough walls. (See BASALT, and TRAP.)

GREENUP, a N. E. county of Kentucky, bordering on the Ohio river; area 480 sq. m.; pop. in 1870, 11,463, of whom 461 were colored. It is hilly and well timbered, has a fertile soil, and abounds in coal and iron. The chief productions in 1870 were 29,842 bushels of wheat, 164,650 of Indian corn, 26,864 of oats, 9,498 of potatoes, and 1,668 tons of hay. There were 747 horses, 533 milch cows, 1,624 other cattle, 2,086 sheep, and 2,834 swine; 7

blast furnaces, 3 tanneries, 1 currying establishment, 2 lime kilns, 3 saw mills, and 1 railroad repair shop. Capital, Greensburg.

GREENVILLE. I. A S. E. county of Virginia, bordering on North Carolina, bounded N. by the Nottoway river, and watered by the Meherrin river; area, 300 sq. m.; pop. in 1870, 6,362, of whom 4,207 were colored. It is traversed by the Richmond, Fredericksburg, and Potomac railroad, and the Gaston branch. The surface is level and the soil moderately fertile. The chief productions in 1870 were 5,524 bushels of wheat, 112,392 of Indian corn, 13,509 of oats, and 33,200 lbs. of tobacco. Capital, Hicksford. **II.** A N. W. county of South Carolina, bordering on North Carolina, and bounded W. by Saluda river; area, about 800 sq. m.; pop. in 1870, 22,262, of whom 7,141 were colored. The Blue Ridge touches the N. border, and the rest of the surface is pleasantly diversified. The soil is generally fertile. The Greenville and Columbia railroad terminates at the county seat, and the Atlanta and Richmond Air-Line railroad crosses the county. The chief productions in 1870 were 44,421 bushels of wheat, 355,526 of Indian corn, 23,698 of oats, 22,499 of sweet potatoes, and 1,864 bales of cotton. There were 1,556 horses, 1,184 mules and asses, 3,561 milch cows, 5,111 other cattle, 7,640 sheep, and 17,400 swine; 4 cotton mills, 2 tanneries, 2 currying establishments, and 1 paper mill. Capital, Greenville.

GREENVILLE. I. A city and the capital of Greenville co., South Carolina, on Reedy river, an affluent of the Saluda, near its source, and on the Atlanta and Richmond Air-Line railroad, at the terminus of the Greenville and Columbia line, 95 m. N. W. of Columbia; pop. in 1870, 2,757, of whom 1,375 were colored. Having an elevated and healthy situation at the foot of Saluda mountain, it is a favorite summer resort. It is the seat of several Baptist educational institutions. Furman university, organized in 1851, in 1873-'4 had 4 professors, more than 50 students, and a library of 2,000 volumes. The Greenville high school, formerly in name and still practically the preparatory department of the university, had 4 instructors and more than 100 pupils. Greenville Baptist female college, organized in 1854, had 9 professors and instructors and about 100 students. The Southern Baptist theological seminary was organized in 1858, and in 1873-'4 had 5 professors, 60 or 70 students, and a library of 3,000 volumes. Greenville has six churches, a national bank, grain mills, a saw mill, planing mills, a coach and wagon factory, a boot and shoe factory, a cotton factory, and two weekly newspapers. **II.** A town and the capital of Greene co., Tennessee, on the East Tennessee, Virginia, and Georgia railroad, 220 m. E. of Nashville, and 66 m. E. by N. of Knoxville; pop. in 1870, 1,039, of whom 253 were colored. It is the seat of Greenville and Tusculum college, organized in 1868 by the union of Greenville and Tusculum colleges,

founded respectively in 1794 and 1844. In 1872 it had 10 professors and instructors, 12 collegiate and 87 (21 female) preparatory students, and a library of 5,000 volumes. Greenville has three weekly newspapers.

GREEN VITRIOL. See COPPERAS.

GREENWICH, a town and borough of Fairfield co., Connecticut, on Long Island sound, and on the New York and New Haven railroad, 30 m. N. E. of New York and 42 m. S. W. of New Haven; pop. in 1870, 7,644. The town borders on the state of New York, forming the S. W. extremity of New England, and contains a savings bank, two hotels, 19 public schools, an academy, and 15 churches. The village is beautifully situated near the water, and contains the residences of many people doing business in New York. Putnam's hill, famous as the precipice down which Gen. Putnam galloped in his perilous escape from the British in 1779, is in the S. W. part of the town.

GREENWICH, a town and parliamentary borough of Kent, England, on the right bank of the Thames, 5 m. S. E. of St. Paul's cathedral, London; pop. of the town in 1871, 169,361. It stands mostly on low, marshy ground. There are numerous churches, chapels, schools, and charitable institutions. But the great objects of attraction are its hospital for seamen, and its observatory, whence longitude is reckoned by the British and often by other geographers. (See LONGITUDE.) The hospital, first opened in 1705, occupies the site of an ancient royal palace called Greenwich house, Placentia, or "The Pleasaunce," a favorite residence of several sovereigns, and the birthplace of Henry VIII., Queen Mary, and Queen Elizabeth. It consists of quadrangular buildings, enclosing a square, each bearing the name of the sovereign in whose reign it was erected. The N. W. quadrangle contains the apartments of the governor and the libraries of the officers and pensioners. The N. E. quadrangle is inhabited by the officers and men. In the S. W. building is the painted hall, adorned with the portraits of British naval heroes and representations of naval victories. In the S. E. division is the chapel, the interior of which is richly decorated. Previous to 1865 the institution generally supported about 2,700 in-pensioners, and from 5,000 to 6,000 out-pensioners. The in-pensioners were amply supplied with food, uniformly clothed, comfortably lodged, and allowed one shilling a week each for tobacco. The out-pensioners receive each an annual stipend which averages about £12. There is an infirmary connected with the hospital, and a school for the children of decayed non-commissioned officers, seamen, and marines, which is attended by 800 scholars. The governorship of the hospital is usually held by some veteran naval commander. By an act of parliament passed in 1865 the in-pensioners were permitted to reside where they pleased, and were allowed two shillings a day besides their service pension. All but 200 or 300

infirm and bed-ridden pensioners thereupon left the hospital, and it is now kept as a medical hospital for wounded seamen in time of war. The income of the hospital amounts to

about £150,000 a year. The observatory was erected by Charles II. for the advancement of navigation and nautical astronomy. Its organization is very complete. It is charged with



Greenwich Hospital.

the transmission of time throughout England by means of electro-magnetic circuits, in addition to its ordinary functions. Greenwich has several large factories, extensive engineering establishments, iron-steamboat yards, ropewalks, &c. The borough comprises Greenwich, Deptford, and Woolwich.

GREENWOOD. I. A S. E. county of Kansas, intersected by Verdigris and Fall rivers; area, 1,155 sq. m.; pop. in 1870, 3,484. The surface is undulating and the soil fertile. The chief productions in 1870 were 35,449 bushels of wheat, 173,590 of Indian corn, 24,492 of oats, 14,774 of potatoes, and 10,485 tons of hay. There were 1,638 horses, 2,323 milch cows, 5,427 other cattle, 3,575 sheep, 1,890 swine, and 5 saw mills. Capital, Eureka. II. An E. county of Colorado, bordering on Kansas; area, about 4,000 sq. m.; pop. in 1870, 510. It has since been absorbed by Bent and Elbert counties. It was intersected by Big Sandy creek, a branch of the Arkansas, and watered in the E. part by the head streams of Smoky Hill river. Irrigation is necessary. Buffalo grass and cactus abound. The Kansas Pacific railroad traverses the region. Capital, Kit Carson.

GREENWOOD, Francis William Pitt, an American clergyman, born in Boston, Feb. 5, 1797, died there, Aug. 2, 1843. He graduated at Harvard college in 1814, and immediately commenced the study of theology under the direction of Dr. Ware, approving in the main, then and for the rest of his life, the doctrines prevalent in Boston under the name of liberal Christianity. In October, 1818, he became pastor

of the new South church and society in Boston; but after a single year his course was arrested by a pulmonary disease. He went to England in 1820, but, not fully recovering his health, resigned his pastorate. He returned in the autumn of 1821, passed a little more than two years at Baltimore, preached occasionally, and wrote for and edited for nearly two years a periodical called the "Unitarian Miscellany." In 1824 he became colleague of Dr. James Freeman, pastor of King's chapel, Boston, who with the consent and coöperation of his society had revised the "Book of Common Prayer" there used so as to exclude the recognition of the Trinity. Bodily infirmities compelled Dr. Freeman to give up the pulpit in 1827, and Mr. Greenwood took the full charge. He had a strong taste for the natural sciences, conchology and botany being his especial favorites, and he was one of the first members of the Boston society of natural history. A return of hæmorrhage of the lungs compelled him to make a voyage to Cuba in 1837. While confined to a sick chamber the year before his death, he prepared for publication "Sermons of Consolation" (1842). He was also the author of "History of King's Chapel" (Boston, 1833), "Lives of the Twelve Apostles" (1838), "Sermons to Children," and numerous contributions to periodicals. After his decease Samuel A. Eliot edited two volumes of his sermons from the MSS., and prefaced them with a memoir of the author; and a volume of his miscellaneous writings was published by his son (1846).

GREER, the N. W. county of Texas, as claimed by the state authorities, lying between the forks of Red river; area, 3,480 sq. m.; still unsettled. There is considerable good land, but little timber. This region is claimed by the United States as being within the limits of the Indian territory.

GREG, William Rathbone, an English author, born in 1812. He has published "Investments for Working Classes" (1852); "Essays on Political and Social Science" (1854); "Creed of Christendom, its Foundations," &c. (1863); "Literary and Social Judgments" (1868); "Truth vs. Edification" (1869); "Why are Women Redundant?" (1869); "Political Problems for our Age and Country" (1870); "The Great Duel, its True Meaning and Uses" (1871); and "Enigmas of Life" (1872). He has been a frequent contributor to the English periodicals. Several of his works have been reprinted in the United States.

GREGARINA, the best known genus of the *gregarina*, a division of protozoa, with no mouth and without the power of sending out the delicate filaments of sarcode characteristic of the foraminifera. They are among the lowest of the protozoa, parasitic, varying in size from a pin's head to half an inch in length; they infest the intestines of various animals, principally articulates, as the earth worm, lobster, beetle, and cockroach. They appear like a single cell, filled with a granular and fatty matter, with a nucleus and nucleolus; the external covering may be smooth, bristly, or ciliated. They have no definite organs, and the processes of nutrition and waste must be effected by the general surface of the body, as is common with internal parasites. In reproduction, the nucleus disappears, and the granular sarcode breaks up into little masses, which afterward become pointed, forming the so-called navicellæ; these escape from the ruptured cyst, giving rise to active sarcode masses, which have the property of throwing out processes, like the amœba; these in a suitable locality become developed into *gregarina*. One of the largest, said to be, with the exception of the yolk of the eggs of birds and some other animals, the largest known cell, the *G. gigantea*, is found in the intestine of the lobster; it is nearly two thirds of an inch long, and almost as wide.

GRÉGOIRE, Henri, a French revolutionist, born at Vého, near Lunéville, Dec. 4, 1750, died in Paris, May 28, 1831. He commenced active life as a parish priest, and being nominated by the clergy of Lorraine in 1789 to represent them in the states general, he at once took ground as a republican, and was one of the first of the clergy to take the oath of fidelity to the constitution. He voted against primogeniture and special privileges, and zealously advocated the admission of Jews and men of color to full rights of citizenship. Under the new constitution of the clergy the department of Loir-et-Cher in 1792 elected him bishop, on which he

assumed, from the seat of the episcopate, the appellation of bishop of Blois. In the convention he led the movement for the abolition of the regal office, and made a bitter speech against kings in general, ending by demanding that Louis Capet should be brought to trial. One maxim of his became a watchword of the revolution: *L'histoire des rois est le martyrologe des nations*. His oration caused him to be made, the same day, president of the convention. He was absent with three other delegates on a mission to revolutionize Savoy when the king was brought to trial, but with his colleagues he wrote from Chambéry to the convention, urging the condemnation of the king, though he afterward denied that he wished him to be condemned to death. Further, he says he endeavored to save the life of the king by proposing to abolish the death penalty. When Gobel, archbishop of Paris, assented to the worship of Reason, Grégoire boldly refused to follow his example. He contributed zealously to preserve the monuments of art, and extended his protection to men of letters and artists. In 1800 he entered the legislative body, and having been transferred in 1801 to the senate, formed one of the minority of five opposed to the accession of the first consul to the throne. He alone opposed the reestablishment of titles of nobility. Napoleon unwillingly, on the request of both houses of the legislature, afterward made him a count of the empire and officer of the legion of honor. He was also opposed to the emperor's divorce, and declined to be present at the marriage with Maria Louisa. On Napoleon's reverses in 1814 Grégoire pronounced a vehement oration against him. On the second restoration he was excluded from the institute, deprived of his bishopric, and compelled by the stoppage of his pension to sell his library for the means of support. He retired to Auteuil, where he passed the last 15 years of his life in literary labor. He never renounced his republican principles. The last offices of religion were denied him on his deathbed by his ecclesiastical superiors; but the civil power having interfered, funeral rites were performed over his body in the church of the Abbaye aux Bois by a proscribed priest. The people then took his remains in charge, and, removing the horses from the hearse, drew it to the cemetery of Mont Parnasse. Bernardin de l'Oise describes Grégoire's character in saying that he wished to "Christianize the revolution." The most important of his numerous publications are his *Histoire des sectes religieuses* (2 vols., 1810); *Essai historique sur les libertés de l'Eglise gallicane* (1818); *De l'influence du Christianisme sur la condition des femmes* (1821); *Histoire des confesseurs des empereurs, des rois et d'autres princes* (1824); and *Histoire du mariage des prêtres en France* (1826). He also wrote a work entitled *De la littérature des nègres*, containing sketches of the lives and writings of negroes "who have distinguished themselves in science,

literature, and the arts." This work has been translated into English, and published both in Great Britain and the United States. His *Mémoires* were published in 1837.

GREGORIAN CHANT, a method of singing the psalms and litanies of the church, introduced by Pope Gregory the Great about 590. It was mainly founded on the Ambrosian chant, previously in use in the western churches, to the four authentic or principal modes of which Gregory, either for variety or convenience of the voice, added the plagal or collateral modes. His additional object in effecting this reform was to banish from the church all rhythmic singing, as too lively for the place and occasion, and to substitute in his own chant, which was called the *canto fermo*, a gravity and simplicity suited to the solemn offices of the church. He also established in Rome a school of instruction in the new method of singing, which existed for three centuries after his death. Notwithstanding the monotony of the Gregorian chant, its extreme simplicity and dissimilarity to secular music, or even to that at present employed in the services of the church, it is still in use, and during Lent and on other special occasions may be heard in all its ancient glory in Roman Catholic churches, and to a limited extent in those of other denominations. It has been supposed that fragments of the melodies sung in the celebration of the Eleusinian mysteries are discernible in the Gregorian chant.

GREGOROVIVS, Ferdinand, a German author, born at Neidenburg, Prussia, Jan. 19, 1821. He entered the university of Königsberg in 1838, studied theology and philosophy, and afterward devoted himself to poetry and history. His first important work was *Goethe's Wilhelm Meister in seinen socialistischen Elementen* (Königsberg, 1849), in which he showed a profound knowledge of the work of the great poet, and presented many striking views of modern life. He published in 1848 a small work on Poland, in 1849 *Polen- und Magyarenlieder*, and in 1851 the tragedy *Der Tod des Tiberius und Geschichte des römischen Kaisers Hadrian und seiner Zeit*. In 1852 he travelled through Italy, and the results of his studies and observations were published in *Corsica* (2 vols., Stuttgart, 1854), *Figuren, Geschichte, Leben und Scenerie aus Italien* (4th ed., Leipsic, 1874), *Lateinische Sommer* (1863), and *Siciliana* (3d ed., 1874). The last three have been published under the title *Wanderjahre in Italien*, including *Von Ravenna bis Mentana* (4 vols., 1874). He also published *Lieder des Giovanni Meli von Palermo* (1856), *Die Grabmäler der römischen Päpste* (1857), and a long poem, *Euphorion* (1858; illustrated ed., 1872). His most important works are *Geschichte der Stadt Rom im Mittelalter* (8 vols., Stuttgart, 1859-'72; 3d ed., 1874; Italian translation, Venice, 1874 *et seq.*), and *Geschichte der Lucrezia Borgia* (2 vols., 1874).

GREGORY, a S. county of Dakota, bounded N. E. by the Missouri river, recently formed, and not included in the census of 1870; area,

about 1,400 sq. m. It is separated from Nebraska on the south by the Niobrara and Keya Paha rivers.

GREGORY, the name of 16 popes. **I. Saint**, surnamed the Great, born of a noble family in Rome about 540, died March 12, 604. His parents were patricians of great wealth. His father, Gordianus, renounced his senatorial rank to become a clergyman, and when he died was one of the seven *regionalarii* or cardinal deacons; and his mother, Sylvia, devoted herself at the same time to an ascetic life. To a commanding presence and affable manners Gregory united great learning and executive ability. He was appointed governor or prefect of Rome about 573, but soon abdicated the office, withdrew from the world, and, after his father's death, employed his revenue in founding religious institutions, changed his own house on the Cælian hill into a monastery, and himself became a monk in it. On seeing one day some handsome English youths exposed for sale in the market place, he exclaimed, "They would be angels rather than Angles, were they only Christians!" Carried away by the desire of converting England, he besought the pope to allow him to go thither; and he set out by night from Rome, but was followed and brought back by the people. Pope Pelagius II. named him one of the seven regional deacons, and shortly afterward sent him as legate to Constantinople. He convinced the heretic Eutychius of his error, won the good graces of the emperor Mauricius, and was recalled to Rome about 585. During this period he wrote his *Libri Moralium*, a commentary on Job. In 590 the plague broke out in Rome, and Pope Pelagius having died of it, Gregory was unanimously chosen to fill his place. He wrote to the emperor Mauricius beseeching him not to ratify the election; but the letter was intercepted by the prefect of Rome, one of quite a different import despatched in its stead, and the consent of the emperor obtained without delay. Meanwhile Gregory had fled from Rome and concealed himself; but his retreat was discovered, and on Sept. 3, 590, he was consecrated in the church of St. Peter. Pestilence and famine were desolating Italy at that time, and hostile armies were on their march toward Rome. He called his clergy around him, labored at their head night and day to stay the ravages of the plague, collected funds and purchased large stores of grain in Sicily, which brought back plenty to the city, and by his eloquence arrested the invasion of the advancing Lombards. He bent his whole mind on reforming the abuses which had crept into the clerical body, many of which had become inveterate, and sent missionaries to all parts of the known world. Among them Augustin and his companions went by his order to England, which was soon converted to the faith. He extinguished Arianism in Lombardy, and combated it incessantly in Spain, where he won over to orthodoxy the king Recared; in Africa

he put down the Donatists, and in Constantinople opposed energetically the pretensions of the patriarch John the Abstinist to the title of oecumenical patriarch, assuming as his own title that of "servant of the servants of God," which was adopted by the subsequent bishops of Rome. Equally tolerant and zealous, while using every endeavor to spread the faith, he would have no other means employed for that purpose than those of an exemplary life and rational instruction. He reprimanded the bishop of Terracina, who would not permit the Jews to assemble for religious worship; and wrote in the same spirit to the bishops of Sardinia, Sicily, and Marseilles. At Cagliari a converted Jew had changed a synagogue which he owned into a Christian church; Gregory commanded that it be restored to its former use. He deplored the evils of slavery as it existed before his time, and seeing it aggravated by the barbarian wars, he emancipated all his own slaves as an example. His works, besides his *Libri Moralium*, are *Liber Regulae Pastoralis*, 4 books of dialogues, and 14 books of letters. The best edition is that of the Benedictines (4 vols. fol., Paris, 1705). An old English version of his dialogues, edited by Henry James Coleridge, S. J., was published at London in 1874. A life of St. Gregory was written by Paul the Deacon, another by John the Deacon, and a history of his pontificate by Maimbourg. **II. Saint**, born in Rome in the latter half of the 7th century, died in February, 731. He was equally renowned for learning and virtue when elected to the papal chair, in May, 715. He found Constantinople given up to revolutions in the imperial palace, the coasts of Italy open to the incursions of the newly created Mohammedan navy, and the interior ravaged by the Lombards. The emperor Leo the Isaurian urged in both east and west the persecution of those who honored images, and Gregory opposed him, while upholding his authority in Italy. He built up at his own expense the ruined walls of Rome, purchased back from the Lombards the city of Cumae, persuaded King Liutprand to restore Sutri to the emperor, and some time afterward stopped the united forces of Liutprand and the exarch of Ravenna at the gates of Rome, and induced them to spare that city. He was most zealous in promoting the conversion of infidels, sent St. Boniface to preach the gospel among the Germans, and wrote to Charles Martel to beg his protection for the missionaries. He restored the ruined monastery of Monte Cassino, published important laws concerning Christian matrimony, and was firm in enforcing clerical morality. There are 17 letters of this pope in Labbe's collection of the councils, vols. vi. and vii. **III.** Born in Syria, succeeded Gregory II. in 731, died in 741. He wrote to the emperor Leo, reproaching him for upholding the iconoclasts; but finding that prince incorrigible, he assembled a council in 732, which excommunicated them as heretics. The

Lombards annoyed him, and in the hope of obtaining the aid of Charles Martel against them he sent an embassy to France, but the application proved fruitless. Gregory was the first pope who ruled the exarchate of Ravenna in a temporal sense, not in virtue of any formal donation, but because, abandoned by the Greeks, the citizens saw no one to whom they could appeal for protection but the bishop of Rome. **IV.** Born in Rome, made pope in 827, died in 844. He rebuilt the city of Ostia, to defend the mouth of the Tiber against the inroads of the Mussulmans who had taken possession of Sicily. He went to France in the hope of putting an end to the dissensions between Louis le Débonnaire and his sons, but failed, and returned to Rome disgusted with both parties. **V. Bruno**, a Saxon, nephew of the emperor Otho II., elected pope in May, 996, died in 999. His pontificate was troubled by Philogethes, bishop of Piacenza, who became antipope under the name of John XVI. The latter was sustained by Crescentius, consul of Rome, but finally driven thence by Otho III., and excommunicated by Gregory in the council of Pavia, 997. Otho was crowned by his cousin in 996. **VI. John Gratianus**, a Roman, and archpriest of the Roman church, elected pope, some say by simoniacal means, April 8, 1045, died in 1047. He resigned at the council of Sutri in December, 1046, and retired to the monastery of Cluny. **VII. Hildebrand, Saint**, born at Soano, Tuscany, about 1018, died in Salerno, May 25, 1085. He was the son of a carpenter, and was educated by his uncle in a Roman monastery. He afterward went to France, and became a monk of Cluny. Recalled to Rome, and made prior of the abbey of St. Paul *extra muros*, he found his church almost in ruins, the community reduced to a few members, and nearly all its lands in the possession of powerful laymen. With an energy which foreshadowed his career, he recovered the lands, restored the church, improved the discipline, and increased the community. He gained the favor of Gregory VI., became the confidential adviser of Leo IX., and preserved his influence under Victor II. and Alexander II. By Gregory VI. he was sent to France in 1045 to urge the extirpation of simony. He had a law passed against it in a council at Lyons, and presided in the council of Tours, in which Berengarius recanted his opinions concerning the eucharist. He was instrumental in effecting the election of Nicholas II. and Alexander II.; and was himself chosen pope on April 22, 1073. It is asserted that he did not seek this elevation, and that he wrote to Henry IV., then in Bavaria, beseeching him to have the election set aside, and giving the emperor warning that if he occupied the papal chair he would call him to account for his tyranny and licentiousness. Henry sent officers to examine into the hasty election, ratified it, and allowed Gregory to be consecrated on June 30. Once enthroned, he resolved to purge the priesthood of the two enor-

mous evils of simony and unchastity, and to emancipate the church from the interference of the temporal power. He wrote to the countess Beatrice and her daughter Matilda to hold no communion with the simoniacal bishops of Tuscany. The emperor, who made no scruple or secret of selling ecclesiastical livings to the highest bidder, both in Germany and Italy, had thus twice disposed of the see of Milan. Gregory deposed the archbishop as an example to offenders, and held a council in Rome, in which it was made a law that all persons guilty of simony should be *ipso facto* excommunicated as incapable of exercising ecclesiastical jurisdiction, and disqualified for holding any benefice whatever. It was furthermore decreed that all married and unchaste priests should be degraded from their office. This legislation produced great excitement throughout Germany, where an attempt to enforce it well nigh cost the archbishop of Mentz his life. It brought the pope into direct collision with the emperor, who traded in benefices. Henry had been summoned to Rome to answer for his tyrannical and licentious conduct; he laughed at the summons, and derided the legates whom Gregory repeatedly sent to bring him to a sense of his wrong doing. In 1075 Cencius, prefect of Rome, had been excommunicated, with several of his abettors, for various crimes. On Christmas eve, while the pope was celebrating midnight mass at Sta. Maria Maggiore, Cencius rushed into the church with a body of armed men, who dragged Gregory from the altar, wounded him in the neck, and hurried him off to a prison. This outrage was attributed by some to the emperor's instigation. The only reply Henry made to the papal summons was to assemble a council at Worms in 1076, which passed a sentence of excommunication against Gregory. Henry informed him of this in a letter addressed "to the false monk Hildebrand," which the imperial messenger handed to the pope at Rome in the midst of the solemn session of the council. A sentence of excommunication was fulminated against the emperor, whose crown was declared forfeited. Saxony and Thuringia had already been driven into open rebellion by the conduct of Henry; on reception of the tidings from Rome, a majority of the princes of the empire and several bishops met near Mentz, and, after vainly summoning Henry to appear and make satisfaction, they elected in his stead Rudolph, duke of Swabia. Abandoned by his adherents, Henry was compelled to sue for pardon, crossed the Alps, and presented himself before the pope, who had taken refuge in the castle of Canossa. Whatever truth there may be in the relations of those who assert that the pontiff kept the suppliant emperor three whole days in the court of the castle, clad in a single garment and shivering in the cold of January, we may well believe that he treated him with severity. Absolved from excommunication, Henry returned, fought his enemies, and re-

gained his crown by the death of Rudolph. The pope in absolving him had not reinstated him in his imperial rank; hence the resistance he met with on his return to Germany, and hence, too, the animosity with which from that moment he pursued Gregory to the death. In 1081 he crossed once more into Lombardy, and assembled a council, which deposed and excommunicated the pope, and elected in his stead Guibert, archbishop of Ravenna, with whom Henry advanced toward Rome, but withdrew at the approach of Robert Guiscard and his Normans. He returned the next year with no better success, but on his third attempt was admitted into Rome by the treachery of some of the citizens. The pope fled to the fortress of Sant' Angelo, and Guibert was enthroned as Clement III.; but Robert hastened by forced marches to the relief of Gregory, and Henry with his antipope withdrew from Rome. The Tuscan forces were victorious in Lombardy over Gregory's enemies, but his health was hopelessly broken. Robert, his deliverer, was unwilling to allow him in his enfeebled state to remain within reach of his persecutors, and persuaded him to rest for a while in Monte Casino, and then to take up his abode temporarily in Salerno, where he died repeating the words, *Dilexi justitiam et odii iniquitatem, propterea morior in exilio* ("I have loved righteousness and hated wickedness, therefore do I die in exile"). These words may still be read on his tomb in the church of St. Matthew in Salerno. There is a collection of his letters in the Bollandists' *Acta Sanctorum*. See also his epistles in Migne's *Patrologie*, vol. cxlviii.; his life by the German Protestant Voigt; and the posthumous work of Villemain, *Histoire de Grégoire VII.* (2 vols. 8vo, Paris, 1873; English translation by Brockley, London, 1874). **VIII. Alberto de Mora**, succeeded Urban III., Oct. 21, 1187, died Dec. 17 of the same year. He is not to be confounded with the antipope Bourdin, who assumed the name of Gregory VIII. **IX. Ugolino**, succeeded Honorius III. in 1227, died in Rome, Aug. 21, 1241. He is remarkable chiefly for his protracted struggle with the emperor Frederick II. (See FREDERICK II. of Germany.) **X. Tebaldo Visconti**, born in Piacenza about 1209, died in Arezzo, Jan. 10, 1276. He became successively canon of Lyons, archdeacon of Liège, and cardinal. He was papal legate in Palestine, when, after an interregnum of three years, he was elected pope Sept. 1, 1271. He opened the second general council of Lyons in 1274, made vain endeavors to rouse Christian princes to succor Palestine, effected a temporary reunion of the Greek and Latin churches, and was the first to enact a stringent law for the holding of conclaves. (See CONCLAVE.) Gregory X. was beatified in 1713. **XI. Pierre Roger**, born in Lower Limousin in 1329, elected pope in 1370 (the last Frenchman who has occupied the pontifical chair), died March 27, 1378. To him belongs

the credit of having put an end to what was called the captivity of Babylon, meaning the residence of the popes at Avignon. Yielding to the solicitations of many of the most eminent persons in Christendom, he quitted Avignon in 1376, and returned to Rome at the beginning of 1377. This pope was the first who condemned the teachings of Wycliffe.

XII. Angelo Corario, born in Venice about 1325, elected pope in 1406, died at Recanati, Oct. 18, 1417. For an account of him see CONSTANCE, COUNCIL OF.

XIII. Ugo Buoncompagni, born in Bologna, Feb. 7, 1502, elected pope May 13, 1572, died April 10, 1585. Distinguished as a lawyer and professor of civil and canonical jurisprudence, he appeared with success at the great council of Trent. His pontificate is remarkable as the epoch of the reformation of the calendar. (See CALENDAR.)

The *Decretum Gratiani* (see CANON LAW) was published by him in splendid style, and with copious notes, some of which were from the pope's own hand. The end of his pontificate was signalized by the appearance in Rome of an imposing embassy from Japan, sent by some of the princes who had been recently converted to the Christian faith.

XIV. Niccolò Sfondrati, born in Cremona, elected pope Oct. 8, 1590, died in 1591.

XV. Alessandro Ludovisi, born in Bologna in 1554, elected pope Feb. 9, 1621, died July 8, 1623. He founded the celebrated congregation de *propaganda fide*, a sort of foreign office for the disposing and arranging of ecclesiastical affairs of missionary countries throughout the world. He canonized four celebrated saints of the Catholic church, Ignatius Loyola, Francis Xavier, Philip Neri, and Teresa. He enacted that the balloting for the election of new popes should be done secretly.

XVI. Bartolommeo Alberto Capellari, born in Belluno, Sept. 18, 1765, died in Rome, June 1, 1846. He assumed the name of Mauro on making his profession in the order of Camaldolese monks in 1783, became proficient in the oriental languages, taught theology with much distinction, published in 1799 *Il trionfo della Santa Sede e della Chiesa*, and in 1801 was elected a member of the academy of the Catholic religion in Rome, where he annually lectured on subjects bearing on the relations between science and revelation. In 1807 he was appointed one of the censors of the academy, and elected vice procurator general of his order, and abbot of his monastery in Rome. In 1809 the violent abduction of Pius VII. was followed by the dispersion of the religious orders. Capellari withdrew to his native country, and taught theology in the monastery of St. Michael at Murano. In his island solitude he remained comparatively quiet till 1812, when the ancient and magnificent library of the monastery was seized, and either sold at auction or sent to enrich the libraries of Venice. In the beginning of 1814 he and his pupils and fellow professors took refuge in Padua. Recalled to Rome after the return of Pius VII.,

he was made procurator general of his order, consultor of the Propaganda, examiner of bishops, commissary for examining works on oriental liturgical literature, and vicar general of the Camaldolese. He was preconized cardinal March 13, 1826, and became prefect of the Propaganda. He was charged soon after with negotiating a concordat with the government of the Netherlands in favor of the Catholic citizens, and with regulating the ecclesiastical affairs of the United States, and obtained from the Turkish government the emancipation of the Armenian Catholics. On Feb. 2, 1831, after 50 days of conclave, he was elected pope. The secret societies which aimed both at Italian unity and at secularizing the administration of the States of the Church, made some insurrectionary movements at the beginning of his pontificate. With Prussia a long controversy arose about mixed marriages, the government claiming to regulate them as belonging solely to the civil administration. The archbishop of Cologne was imprisoned for his resistance, and the pope energetically interfered in his favor. The Catholics of Russian Poland were also subjected to oppression to induce them to join the Greek church; and the pope used no less energy in protesting against this violence through his representative in St. Petersburg. He solemnly condemned the innovations of Hermes in theology, and the extreme political radicalism of Lamennais. He spared no effort to spread the Catholic religion in both hemispheres, and to stimulate at home the zeal of all ranks of the priesthood for the attainment of solid learning and purity of life. In Rome he gave a great impulse to the study of the sciences and fine arts, created several museums, and founded a number of establishments of public beneficence and utility. During the 15 years of his reign he gave hospitality to more than one royal exile. In December, 1845, the emperor Nicholas visited Rome, and during his interview with the pope he was bitterly reproached for his cruelty toward the Poles. It is said that Gregory spoke to him as would one on whom the shadow of death had already fallen, threatening the autocrat with that judgment for which he was himself preparing. The emperor was much moved, and returned again to visit his venerable host. It is certain that the Poles experienced less harsh treatment for some years after that.

GREGORY. I. James, a Scottish astronomer and mathematician, born at Drumoak, Aberdeenshire, in November, 1638, died in Edinburgh in October, 1675. He was educated at Marischal college, Aberdeen, and at the age of 24 published his *Optica Promota* (London, 1663), which formed an era in the history of science in the 17th century, and in which he described the reflecting telescope invented by him. In the same work he pointed out the method of employing the transits of Mercury and Venus to determine the sun's parallax. In 1667 he went to the university of Padua, and

soon after published a treatise on the quadrature of the circle and hyperbola by means of a converging series, which involved him in a controversy with Huygens. About 1668 he was chosen professor of mathematics at St. Andrews. In 1674 he accepted the same chair in Edinburgh, and a year later was struck with sudden blindness, and died a few days afterward. He was the inventor of the concave burning mirror, of methods for squaring curves and making logarithms by an infinitely converging series, and of a variety of other ingenious mathematical and geometrical processes. **II. David**, nephew of the preceding, born in Aberdeen, June 24, 1661, died about 1710. He was educated at the university of Edinburgh, where he was appointed professor of mathematics in 1684, and was instrumental in introducing the Newtonian philosophy. In the same year he published a Latin treatise on the dimensions of figures, *Exercitatio Geometrica*, which is esteemed his best work. In 1692, chiefly through the influence of Flamsteed and Sir Isaac Newton, he was appointed Savilian professor of astronomy at Oxford, the celebrated Dr. Halley being his competitor. In 1702 appeared his *Astronomia Physica et Geometria Elementa*, a sort of digest of Newton's *Principia*, which Newton himself highly commended; and in 1703 he published an edition of Euclid in Greek and Latin. He was engaged at the time of his death upon an edition of Apollonius, which was completed by Halley. Newton intrusted Gregory with a manuscript copy of his *Principia*, and in a second edition availed himself of his friend's marginal comments. **III. John**, grandson of James Gregory, born in Aberdeen, June 3, 1724, died in Edinburgh, Feb. 10, 1773. He graduated in medicine at the university of Aberdeen, where he filled the chair of medicine from 1756 to 1764, when he removed to Edinburgh. From 1766 till his death he was professor of the practice of physic in the university of Edinburgh. His principal works are "Elements of the Practice of Physic" (Edinburgh, 1772), left unfinished, and "A Father's Legacy to his Daughters" (1774).

GREGORY, Olinthus Gilbert, an English mathematician, born in Yaxley, Huntingdonshire, Jan. 29, 1774, died in Woolwich, Feb. 2, 1841. He wrote a treatise on the "Use of the Sliding Rule," a "Treatise on Astronomy," and in 1802, in connection with Dr. John Mason Good, undertook to edit the "Pantalogia," a cyclopædia of the arts and sciences. He was appointed a mathematical master at the royal military academy at Woolwich, and in 1806 was raised to the professor's chair, which he held till June, 1838. His principal works are a "Treatise on Astronomy," a "Treatise on Mechanics," the "Evidences of Christianity," and "Memoirs" of the Rev. Robert Hall and Dr. John Mason Good.

GREGORY THE ILLUMINATOR, a saint of the church, the apostle and first patriarch of Ar-

menia, born in 257, died about 332. He was the son of Anag, a prince of the royal family of the Arsacidæ, who having assassinated Chosroes, king of Armenia, was put to death with all his family except Gregory, then two years old. Gregory was taken to Cæsarea in Cappadocia by a Christian nurse, and on becoming of age was there married, but separated from his wife three years later by mutual consent. He went to Rome, attached himself to the suite of Tiridates III., king of Armenia, and accompanied him to that country, where, having refused to sacrifice to idols, he was subjected to various tortures, and finally cast into a dungeon near Artaxata. A benevolent widow supported him here for 14 years. At the end of that time the king, who is said to have been cured by his prayers of a desperate malady, embraced the faith (302). The saint afterward went to Cæsarea, and was consecrated metropolitan of Armenia. Returning to that country, he preached the gospel both E. and W. of the Euphrates, baptized many, destroyed pagan temples, built churches, ordained priests, and, having converted most of the nation, consecrated his son Arisdages as his successor in 318. In 325 he and the king were invited by Constantine to the council at Nice. In 331 he withdrew into a cavern, where he died.

GREGORY NAZIANZEN, a saint and doctor of the church, born about 328, died about 389. His father Gregory, a convert from heathenism, was on account of his holy life and great zeal made bishop of Nazianzus in Cappadocia, which see he governed 45 years, and died when about 90 years old. He and Nonna, the mother of the saint, are recognized as saints in the calendars of the church. The son was carefully educated in the schools of Cæsarea, Alexandria, and Athens, and had for fellow students Basil the Great, Gregory of Nyssa, and Julian the Apostate. At his return to Nazianzus he was baptized, and lived austere as a hermit in company with St. Basil. After some time thus spent in study and religious exercises, he was recalled to Nazianzus, was ordained priest, and assisted his father in the government of his diocese. He fled again for a time to the desert, but fearing to incur the displeasure of heaven by shrinking from his work, he returned to Nazianzus, and on Easter Sunday preached his first sermon. He is considered by many as the most eloquent of all the fathers of the church. His addresses are fervid, florid, and fanciful, for Gregory was a poet, and wrote much in verse as well as in prose. Among his early discourses were two of great severity against the emperor Julian. In 372 he was consecrated by St. Basil bishop of Sasima; but being prevented from occupying that see, he remained to help his father at Nazianzus. In 378 the death of the emperor Valens restored peace to the church, and the pastors everywhere sought to revive in their churches their pristine glory, obscured by 40

years of Arian domination. Some of the principal sees were in a deplorable condition, and in Constantinople especially the Christians were without a pastor, or even a place where they might assemble for worship. Gregory was living in retirement at Seleucia, but many of the bishops desired to place him in the episcopal chair of Constantinople. He finally yielded to their joint entreaties and appeared upon his new field of labor. His lowly and penitential exterior made an unfavorable impression upon the citizens of the proud and wealthy capital of the East. The Arians and Apollinarians derided, and even pelted him with stones. Still his great patience and zeal acted favorably upon the people, aided, as we are told, by several miracles. Many were converted from paganism, heresy, and dissolute lives through his eloquence and learning. Gregory, however, soon became weary of the growing cares of his great see; and although the emperor Theodosius and Pope Damasus and the bishops supported him against his persecutors, especially against an intruded bishop named Maximus, and although even a council called at Constantinople declared him patriarch, he insisted upon resigning all his honors, and retired again to Nazianzus, and withdrew from thence to a solitary abode near Arianzus. Worn out by age and unremitting austerities, he died in his retreat. The Latins honor him on May 9. His ashes were conveyed from Nazianzus to Constantinople, and thence during the crusades to Rome, where they repose under an altar inscribed to his memory in the Vatican church. His works consist chiefly of 55 sermons, 235 letters, and 158 pieces of poetry. Twenty poems are to be found in Tollius, *Insignia Itinerarii Italici* (4to, Utrecht, 1696), called by the editor *Carmina Cygnea*. Muratori published 228 unedited epigrams of Gregory's in his *Anecdota Græca* (Padua, 1709). The principal editions of his works are those of Basel, fol., 1550, with life by Suidas and by Gregory the Presbyter; De Billy, 2 vols., Paris, 1609-11; the Benedictine Dom Maran, Paris, 1788 (only vol. i.; vol. ii., Paris, 1840, edited by the Benedictine Caillan); and vols. xxxv. to xxxviii. of Migne's *Patrologie grecque*, Paris, 1856-'66 (Greek text with Latin translation). A selection of his works was published by Goldhorn (Leipsic, 1854). See Ullmann's *Gregorius von Nazianz* (Darmstadt, 1825), and Villemain, *Tableau de l'éloquence chrétienne au quatrième siècle* (Paris, 1846).

GREGORY OF NYSSA, a saint and father of the church, born in Cappadocia about 331, died about 400. He was a younger brother of Basil the Great, studied with him at Athens and Constantinople, was married, then embraced the ecclesiastical profession, and was ordained lector. Yielding to his passion for literature, he opened a school of eloquence, but was induced by Gregory Nazianzen to dedicate his talents to the ministry. In 370 he became assistant to his brother at Cæsarea, and in 372

was chosen bishop of Nyssa. He was exiled under Valens by the Arians, was deputed in October, 379, by the council of Antioch, to visit the churches of Palestine and Arabia, was present at the council of Constantinople in 381, and again in 382 and 383. Gregory of Nyssa's works contain the most complete philosophical exposition of Christian dogma given before St. Augustine. He follows Origen in his scientific methods, combats expressly his heterodox theorems, and has been accused of leaning toward his theory of the final salvation of all beings. His works were published in part by Sifanus (Basel, 1562-'71); by the Jesuit Fronton du Duc (2 vols., Paris, 1615; vol. iii. edited by Claude Morel in 1638); and by Migne (*Patrologie grecque*, vols. xlv.-xlvii., Paris, 1857-'66). A selection of his works is found in Ohler's *Bibliothek der Kirchenväter*, vols. i.-iv. (Leipsic, 1858).

GREGORY THAUMATURGUS (the wonder worker), a saint of the church, born in Neo-Cæsarea about 210, died there about 270. He is also called Gregory of Neo-Cæsarea. He was educated a pagan until his 14th year, studied the law at Alexandria and Athens, and in 234 entered the school of Origen at Cæsarea, where he remained for five years. He was chosen first bishop of his native city at a time when it only numbered 17 Christians; but, according to historians, he labored so faithfully that at his death only 17 pagans were to be found in his place. Gregory of Nyssa, his biographer, relates from the local traditions the miracles said to have been wrought by him, and which obtained him his surname. His feast is celebrated in the Latin church on Nov. 17. His works, which contain "A Panegyric Oration on Origen" and "A Paraphrase on the Book of Ecclesiastes," are found in vol. x. of Migne's *Patrologie grecque*. See also Eusebius, "Ecclesiastical History," books vi., vii.

GREGORY OF TOURS (GREGORIUS FLORENTIUS GREGORIUS), a saint of the Roman Catholic church, born in Auvergne about 540, died in Tours probably on Nov. 17, 595. He is called the father of French history, was descended from a senatorial family, and educated under St. Gall, bishop of Clermont. In 573 he was elected bishop of Tours; and in 575 he refused to surrender Duke Gontran, who had sought an asylum in the church of St. Martin, to Chilperic and Fredegonda. For this his property was confiscated and his diocese laid waste. Later, Chilperic's son Meroveus having taken refuge there, the king besieged the city of Tours; but Gregory would not give up the fugitive. After the assassination of Chilperic, Gregory displayed on many occasions the same intrepidity in vindicating the rights of the oppressed. In 587 he negotiated the treaty of Andelot between Childebert, Brunehaut, and Gontran, which gave a brief peace to France. His complete works were published by Dom Ruinart (fol., Paris, 1699); and a translation of his *Historia Francorum* by Guizot (2 vols.,

1859; 2d ed., 1863). His life, written in Latin by Odo, abbot of Cluny, in the 10th century, is given by Baillet in his *Vies des saints*.

GREIFSWALD, or *Greifswalde*, a town of Pomerania, Prussia, on the river Ryck, 3 m. from the sea and 20 m. S. E. of Stralsund; pop. in 1871, 17,208. It was once a place of considerable strength, and is still surrounded by a wall, which has been converted into a promenade. It contains a university founded in 1456, which in 1873 had 57 professors and 537 students. Connected with the university is an academy of political economy and agriculture at Eldena. There are also several high schools. The town has manufactories of pins, soap, candles, tobacco, and leather.—Greifswald was founded in the 13th century, soon became flourishing, and was conspicuous as a member of the Hanse league. In the thirty years' war it was taken from Bogislas, duke of Pomerania, by the imperialists under Wallenstein, and soon after (1631) by the Swedes, who were confirmed in its possession by the peace of Westphalia. It afterward often changed masters, being finally annexed to Prussia in 1815.

GREINER, John, an American journalist, born in Philadelphia, Sept. 14, 1810, died in Toledo, O., May 13, 1871. He early became prominent in Ohio as a whig politician, and in the presidential canvass of 1840 wrote "Old Zip Coon," "The Wagoner Boy," and other popular electioneering songs. He was also distinguished as a temperance lecturer. He was state librarian of Ohio from 1845 to 1851, when he was appointed Indian agent for New Mexico, and in 1852 was governor of that territory. He was afterward successively local editor of the "Ohio State Journal," and editor and proprietor of the Columbus "Gazette" and the Zanesville "Times." In 1861 he was appointed receiver of the land office at Santa Fé, and in 1862 sub-treasurer there, which office he held till 1866.

GREIZ, a town of Germany, capital of the senior princes of Reuss, on the right bank of the White Elster, near the Saxon border, 49 m. S. S. W. of Leipsic; pop. in 1871, 11,582. It contains an imposing chateau, with a summer palace, an ancient castle on the adjoining Felsberg, several churches, and a new town hall. Woollen and half-woollen goods (employing 3,000 looms) and many other articles are made here, and about 70 manufacturers of Greiz attend the annual fairs at Leipsic.

GRELLET, Stephen, a Quaker missionary, born in France in 1773, died in Burlington, N. J., Nov. 16, 1855. He was originally a Catholic, and was educated at the military college of Lyons. At the age of 17 he entered the body guard of Louis XVI., after whose execution he escaped to Demerara. In 1795 he went to New York, where, chancing to attend a Quaker meeting, he determined to join that society. In the following winter he removed to Philadelphia, and during the prevalence of the yellow fever there in 1798 he ministered to

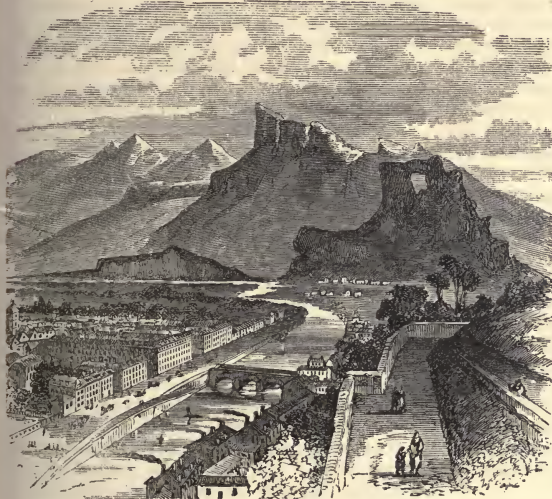
the sick, the dying, and the afflicted. In 1799 he removed to New York and engaged in mercantile business. Becoming impressed that it was his duty to go forth as a missionary, he made a tour into the southern states in 1800, and in 1801 into New England and Canada. In 1807 he visited the south of France, and in 1812 travelled in England and Germany. In 1816 he preached to the inhabitants of Hayti, and in 1818 and the two following years he travelled through Norway, Sweden, Russia, Greece, and Italy, having an audience of the czar, and preaching before the pope. He returned to New York in 1820, and again travelled through Europe from 1831 to 1834, when he retired to Burlington.—See "Memoirs of Stephen Grellet," edited by B. Seeböhm (Philadelphia, 1868).

GRENADA, a British colony and island in the West Indies, the most southerly of what are called the Caribbean islands, between lat. 11° 58' and 12° 20' N., and lon. 61° 40' and 61° 55' W., about 90 m. from the nearest part of South America; length from N. to S. about 24 m., greatest breadth 12 m.; area, 133 sq. m.; pop. in 1871, 37,684, about one tenth of whom were whites. A range of mountains, whose highest peak, Mt. St. Catharine, is 3,200 ft. above the sea, traverses the whole length of the island, with outliers of less elevation. Numerous small rivers rise in these mountains, the principal of which are the Great Bucolet, Duquesne, Antoine, St. John's, and Beau Séjour. In the centre of the island, and 1,700 ft. above the sea, is a circular lake 2½ m. in circumference. The island is divided into six districts called parishes. The capital, St. George (pop. 5,000), is on the S. W. coast, near a large and strongly fortified bay, which is capable of giving shelter to a large fleet of first class vessels. It is nearly landlocked, and steamers of 1,800 tons can lie alongside the wharves. This port is a coal depot and central station for the British West India mail steamers. Grenada is governed by a lieutenant governor, a council of 12 members, and a legislative assembly of 17. The revenue in 1870 was £23,106, the expenditure £20,824; the public debt in 1869 was £7,000. The imports in 1870 were in value £104,475, and the exports £127,184. The staple products of the island are sugar, rum, molasses, and cacao of a superior quality. Among the minor articles of export are yams, charcoal, and arrowroot. The Grenadines are four small islands in the vicinity of Grenada, the largest of which, Carriacou, is 7 m. long and 2½ m. broad; total pop. 3,000.—Grenada was discovered by Columbus in 1498, and was at that time peopled by the fierce and warlike Caribs. In 1650 the first European settlement was made by Du Parquet, the French governor of Martinique, who landed with 200 followers, and speedily conquered the island and massacred the natives. In 1762 it was conquered by the British, from whom it was retaken by the French in 1779, and by them restored to Great

Britain at the peace of 1783. Slavery was completely abolished in 1838, at which time the slaves numbered 17,190, and the free population 3,804, most of whom were colored.

GRENADA, a N. county of Mississippi, intersected by Yallahusha river; area, about 400 sq. m.; pop. in 1870, 10,571, of whom 6,642 were colored. The surface is level, and the soil fertile. It is traversed by the Mississippi and Tennessee and the Mississippi Central railroads. The chief productions in 1870 were 191,675 bushels of Indian corn, 19,548 of sweet potatoes, and 6,479 bales of cotton. There were 832 horses, 1,108 mules and asses, 1,976 milch cows, 4,484 other cattle, 2,059 sheep, and 9,419 swine; also, 2 saw mills. Capital, Grenada.

GRENOBLE (anc. *Ularo* or *Gratianopolis*), a fortified city of France, capital of the department of Isère, on both sides of the river Isère, 58 m. S. E. of Lyons and 290 m. S. E. of Paris; pop. in 1872, 42,660. The old part



Grenoble.

of the city, called the faubourg St. Laurent, is on the N. bank of the river, and is connected with the modern quarter on the opposite bank by two bridges. The church of Notre Dame, the episcopal palace, a hospital, several convents, halls of justice, a theatre, arsenal, and citadel are admired. There is a public garden, a normal school, schools of design and of architecture, a college, a public library of 80,000 volumes and 1,200 MSS., a museum, a cabinet of natural history, manufactories of kid gloves (which alone employ several thousand hands), liqueurs, leather, &c., and a trade in hemp, iron, and marble. The city was called Gratianopolis in honor of the emperor Gratian in the 4th century, and its present name is a corruption of that word. It was afterward the capital of Dauphiny.

GRENVILLE, an E. county of Ontario, Canada, bordering on the St. Lawrence, and bounded N. by the Rideau river and canal; area, 463 sq. m.; pop. in 1871, 22,616. It is well watered, and is traversed by the Grand Trunk and the St. Lawrence and Ottawa railroads. Capital, Prescott.

GRENVILLE, George, an English statesman, the reputed author of the famous stamp act, born Oct. 14, 1712, died Nov. 24, 1770. He was chosen to parliament in 1741, and continued a member till the time of his death. In 1762 he was made successively secretary of state and first lord of the admiralty. In 1763 he was appointed chancellor of the exchequer and first lord of the treasury; but in 1765 he resigned the premiership, giving place to Lord Rockingham. He was an eloquent speaker and an able man of business.

GRENVILLE, Richard. See TEMPLE, EARL.

GRENVILLE, Greenville, or **Granville**, Sir Richard, an English naval officer, born in the west of England in 1540, died at sea in 1591. He was nearly related to Sir Walter Raleigh. At the age of 16 he served in the German imperial army as a volunteer against the Turks. On his return he was appointed to a command in Ireland, and was made sheriff of Cork. In 1571 he represented Cornwall in parliament, and afterward, being made high sheriff of that county, was knighted by Queen Elizabeth. He entered with ardor into Raleigh's schemes of colonization in America, and in 1585 commanded the fleet of seven vessels carrying 108 colonists which Raleigh despatched to Carolina, sailing from Plymouth April 9. The fleet touched at the Canaries and at the West Indies, where it captured two Spanish frigates, and on June 20 made the mainland of Carolina, or Florida, as it was then called. It narrowly escaped wreck on the cape to which Greenville, in consequence, gave its present name of Cape Fear. It anchored at Wocoken June 26, and passing through Ocracoke inlet made its way to Roanoke. Greenville with a party explored the country for eight days, and in revenge for the theft of a silver cup burned an Indian village and destroyed the standing corn. In August, leaving the colonists under command of Ralph Lane, he sailed for England. On his way home he took a rich Spanish vessel, and was received at Plymouth with high honors, Sept. 18. The next year he recrossed the Atlantic with three ships laden with supplies, but found his colony broken up and the settlers gone. They had departed about three weeks before in a fleet commanded by Sir Francis Drake, who on his way home from the West

Indies had paid them a visit, and found them tired of their situation. Grenville, to keep possession of the country, left 15 men on Roanoke island, and sailed again for England. In 1588 he was made a member of the council created to devise means of defence against the Spanish armada, and in 1591 was raised to the rank of vice admiral and sent with five ships to cruise against the Spaniards in the West Indies. Off the Azores he encountered a Spanish fleet of 53 ships with 10,000 men on board. He gave them battle at 3 P. M., fought them till daybreak, and beat them off 15 times. Four of the Spanish ships sank during the action or soon afterward, and 1,000 Spaniards were killed. Grenville was wounded early in the fight, but refused to go below, and had his wounds dressed on deck. At length he was shot through the body, and was carried into his cabin, upon which the remnant of his crew surrendered. He was taken on board a Spanish ship and well treated, but died in three days.

GRESHAM, Sir Thomas, an English merchant, born in London in 1519, died there, Nov. 21, 1579. He was educated at Cambridge, became a London merchant, and was employed in 1551 in negotiating foreign loans for the government of Edward VI., and subsequently for those of Mary and Elizabeth; and he suggested to the latter the advantage of raising loans from her own subjects rather than from foreign states. He accumulated immense wealth, and was the founder of the first royal exchange, and of Gresham college. By his will his London residence was vested in trustees, who were to see that seven able lecturers, each with a salary of £50 per annum, payable from the rents of the exchange, and having apartments in the mansion, were elected to deliver lectures there on divinity, astronomy, music, geometry, law, physic, and rhetoric. In 1768 the building was sold to government, and the character of the institution modified by act of parliament; the lectures were subsequently read at the royal exchange until it was burned in 1838, and in 1843 the present college was opened.

GRESLON, Adrien, a French missionary in Canada and China, born at Périgueux in 1618, died in 1697. He came to America in 1647, and, after seeing the Huron mission destroyed and many of his fellow missionaries put to death by the Iroquois, returned to Europe in 1650. He went to China in 1657, and remained there till 1670. While in Chinese Tartary he is said to have met an Indian woman whom he had known on Lake Huron, and who had been sold from tribe to tribe. This led to the belief that America and Asia approached each other very nearly.

GRESSET, Jean Baptiste Louis, a French author, born in Amiens in 1709, died in 1777. He was educated at a college of the Jesuits, and at the age of 16 entered the order as a novice. In 1733 he published a poem under the title of *Vert-vert*, in which he ridiculed some of the features of convent life. Having removed to

Paris, he produced successively *La Chartreuse*, *Le carême imprévu*, *Le lutrin vivant*, and *Les ombres*, all of which were received with great favor on account of their spirited style and elegant versification. But the freedom of some of his remarks displeased his religious superiors, and he left the order before the end of his novitiate. He now produced a tragedy, *Edouard III.*, and a few years later *Sidney*, a drama. In 1747 appeared his comedy of *Le méchant*, which procured him admission to the French academy. In the midst of his successes Gresset retired to Amiens, where having married he passed his time in religious employments, in the care of his family, and in attacking various abuses. He condemned the irreligious tendency of his works, committed several unpublished pieces to the flames, and asked pardon of heaven in a copy of verses which Voltaire and Piron ridiculed. He founded an academy of letters at Amiens, and, as director of the French academy, was chosen to congratulate Louis XVI. and Marie Antoinette on their accession to the throne in 1774; in return for which he received a patent of nobility. An edition of his works in 3 vols. was published at Paris in 1811. *Vert-vert* has repeatedly been translated into English.

GRESWELL, Edward, an English ecclesiastical writer, born in Manchester in 1797, died in Oxford, June 29, 1869. After graduation at the university, he became fellow and vice president of Corpus Christi college, and devoted himself to theological literature. His works are valuable and highly esteemed by scholars. Among them are: "Exposition of the Parables and other Parts of the Gospels" (5 vols. 8vo, 1834-'5; *Prolegomena ad Harmoniam Evangelicam* (4th ed., 1845); "Dissertations upon the Principles and Arrangement of a Harmony of the Gospels" (5 vols., 2d ed., 1837); *Fasti Temporis Catholici* (5 vols., with tables, 1852); and *Origines Kalendarie Italice* (4 vols., 1854), showing the early calendars of Romulus, of Numa Pompilius, and of the decemvirs. He also translated into Greek verse Milton's "Comus" and "Samson Agonistes."

GRETCH, Nikolai, a Russian author, born in St. Petersburg, Aug. 14, 1787, died there, Jan. 24, 1867. He acquired eminence as a teacher, and became councillor of state in 1829, and privy councillor in 1862. His best known work is a manual of Russian literature (4 vols., St. Petersburg, 1819-'22).

GRETN A GREEN, a small village of Dumfriesshire, Scotland, 9 m. N. W. of Carlisle, famous for the celebration of irregular marriages until December, 1856, from which date, by the act passed July 29, such marriages were declared invalid, unless one of the parties had been for 21 days a resident of Scotland. The ceremony consisted in an admission before witnesses by the parties that they were husband and wife, this being sufficient, according to the law of Scotland, to constitute a valid marriage. After the ceremony, the officiating functionary (who

was often a blacksmith) signed a certificate of marriage, which was also signed by two witnesses, and then the union became perfect and indissoluble. When they were English, the marriage service of the church of England was sometimes used. The number of these marriages celebrated at Gretna and the other border villages has been said to have averaged about 500 a year.

GRÉTRY, André Ernest Modeste, a French composer, born in Liège, Feb. 8, 1741, died at Montmorency, near Paris, Sept. 24, 1813. At six years of age he was placed in the choir of the cathedral at Liège, was subsequently instructed in music by some of the masters of the place, and at 18 went to Rome, where he pursued his studies for eight years. Going to Paris, he encountered many disappointments, and was on the point of leaving the city in despair when Marmontel's libretto, *Le Huron*, founded on Voltaire's tale, was put into his hands. In a few weeks the music was ready, and the first performance of the opera raised Grétry to the first rank of composers. It was followed by *Lucile*, *Zémire et Azor* (successfully produced upon the English stage under the title of "Selima and Azor"), *Céphale et Procris*, *Richard Cœur de Lion*, *Barbe-Bleue*, and many others, both serious and comic; and for nearly 40 years Grétry enjoyed a popularity in France which the efforts of rival composers could never impair. Sixteen years after his death (1829) his *Guillaume Tell* was produced in Paris with great care, and evoked such enthusiasm that the composer's bust was brought upon the stage attended by the principal singers, who crowned it with laurels. His principal operas are full of grace and spirit, and the music is melodious and dramatic. The authors of his librettos were in nearly every instance men of genius, which will in a measure account for the uniform success of his works. He was one of the principal founders of the French comic opera. In 1780 he published *Essais sur la musique* (3 vols. 8vo).

GREUZE, Jean Baptiste, a French painter, born at Tournus, Burgundy, in 1726, died in Paris, March 21, 1805. He began as a portrait painter; failing in which, he devoted himself to pictures of *genre*. His first works in this class, "A Father explaining the Scriptures to his Family," and "The Paralytic Father," gained him admission to the academy as an associate. For this occasion he painted a historical piece, "Severus reproaching his son Caracalla," which the academy refused to notice, declaring that his admission was wholly due to his merit as a painter of *genre*. Greuze was ambitious to become a historical painter, and went to Rome to study the old masters; but he soon returned to his former style, in which to the end of his career he enjoyed a great reputation. His pictures are highly prized by collectors, and command enormous prices. Among the most celebrated are "The Blind Man Cheated," "The Village Bride," "The Broken Pitcher,"

"The Unnatural Father," and "The Little Girl and the Dog;" the last is by many considered his best picture. These and many others have been repeatedly engraved.

GREVILLE, Sir Fulke (Lord Brooke), an English statesman, born in Warwickshire in 1554, died in London, Sept. 30, 1628. He studied both at Cambridge and Oxford. In 1597 he was knighted, and for several years represented his native county in parliament. In 1615 he was made under treasurer and chancellor of the exchequer, and in 1620 became Baron Brooke. His death was caused by a wound received from an enraged domestic who did not consider his services adequately rewarded. He was the author of several works, including "Life of the renowned Sir Philip Sidney" (1652); "A Treatise of Human Learning, in 15 stanzas;" "A Treatise of Warres, in 68 stanzas;" two tragedies, letters, minor poems, &c. There are two collections of his writings: "Certain Learned and Elegant Workes of Rt. Hon. Fulke Lord Brooke, written in his Youth and familiar Exercise with Sir Philip Sidney" (fol., 1633); and "Remains of Sir Fulke Greville, Lord Brooke" (8vo, 1670). "The Five Years of King James" (4to, 1648), which bears his name, is probably not authentic.

GREVY, François Paul Jules, a French politician, born at Mont-sous-Vaudrez, Jura, Aug. 15, 1813. He became an advocate at Paris, and acquired influence as an opponent both of socialism and of Bonapartism, and after the February revolution was a member and vice president of the constituent and legislative assemblies from 1848 till Dec. 2, 1851. In 1848 he proposed that the executive should be chosen by the national assembly, and hold office at its pleasure, with the title of president of the council of ministers. In 1868 he was named *bâtonnier* of the order of advocates. He was elected to the corps législatif in 1868 and 1869, and in 1871 to the national assembly by three departments, taking his seat for that of Jura, his old constituency. He was president of the assembly from March, 1871, to April, 1873; but declined the invitation of President Thiers to serve longer in that capacity. He published in 1873 *Le gouvernement nécessaire*.

GREW, Nehemiah, an English physician, born in Coventry about 1628, died in London, March 25, 1711. He was the first Englishman who studied vegetable anatomy and physiology, and was elected in 1677 secretary of the royal society. His principal works are: "The Anatomy of Plants, with an Idea of the Philosophical History of Plants" (fol., 1682); "Cosmologia Sacra, or a Discourse of the Universe as it is the Creature and Kingdom of God" (fol., 1701); and "A Catalogue and Description of the Natural and Artificial Rarities belonging to the Royal Society."

GREY, a W. county of Ontario, Canada, bounded N. E. by Georgian bay and Owen sound, and watered by Saugeen river and smaller streams; area, 1,800 sq. m.; pop. in

1871, 59,395, of whom 23,511 were of Irish, 17,551 of Scotch, 11,283 of English, 4,702 of German, and 426 of French origin. The land is rough, sandy, and stony, but supports a valuable growth of pine. The county is intersected by the Toronto, Grey, and Bruce railway. Capital, Owen Sound.

GREY. I. Charles, earl, an English statesman, born at Fallowden, Northumberland, March 13, 1764, died at Howick house, July 17, 1845. He entered parliament as member for Northumberland in 1786, and attached himself to the whig party, then under the leadership of Fox. In 1788 he was appointed one of the managers of the trial of Warren Hastings. In 1792 he was one of the founders of the "Society of the Friends of the People," whose object was to obtain a reform in parliament. About this time he attempted to mitigate the law of imprisonment for debt. Being in opposition, he was unsuccessful in his endeavor to obtain a committee of inquiry into the conduct of ministers, in his plan of parliamentary reform, and in his proposal to abolish a number of Irish rotten boroughs. Pitt having died in 1806, a new ministry was formed under Lord Grenville, and Grey, now Baron Howick, was appointed first lord of the admiralty, Fox being secretary for foreign affairs. Fox dying in September, Grey took his place. Lord Grenville and he were now the recognized leaders of the whig party, Grenville in the house of lords and Grey in the commons. During this session Grey carried through the bill for the abolition of the slave trade, and moved the abolition of the oath which excluded Roman Catholics from rank in the army and navy. His proposal was met with violent opposition by the Protestant interest, and the king exacted from his ministers a written pledge that they would not press a measure which he considered perilous to church and state. Grey declined to give such a promise, resigned, and the cabinet was broken up. The death of his father in the succeeding year called him as Earl Grey to the house of lords. For the 18 years succeeding the death of Percival (1812-'30) Earl Grey ably led the opposition. The chief events of his career during this period were his opposition to a renewal of the war in 1815; his condemnation of the coercive measures of the government against the people in the depression and restlessness which followed the peace; his opposition to every attempt to abridge the right of public meeting, and to the bill of pains and penalties against Queen Caroline; his support of Huskisson's measures of commercial reform; and his vehement hostility to Canning's administration. He had the satisfaction in 1829 of seeing the Catholic emancipation act passed. The French revolution of 1830 and other causes having given a new impulse to the agitation for reform, the tory ministry under Wellington was obliged to retire, and William IV. requested Earl Grey to form a government;

he consented only on condition that the reform of the parliamentary representation should be brought forward as a cabinet question. In November, 1830, the new premier announced in the house of lords that the policy of his administration would be "peace, retrenchment, and reform;" and in March, 1831, the first reform bill was introduced. On May 7, 1832, a motion having been carried which was considered hostile to the reform measure, the ministry resigned, and the duke of Wellington undertook to form a new administration. On May 17, however, Earl Grey returned to power; on June 4 the reform bill passed the house of lords, and three days afterward it received the royal assent. He resigned in July, 1834, in consequence of Irish difficulties. **II. Henry George**, earl, an English statesman, son of the preceding, born Dec. 28, 1802. He entered parliament in 1826. On the formation of the reform ministry by his father in 1830, Lord Howick, as he was then called, was appointed under secretary for the colonies, but resigned in 1833 in consequence of his disapproving the details of the measure for negro emancipation. For a few months of 1834 he was under secretary for the home department. He was secretary at war in the Melbourne administration from 1835 to 1839. When the Peel administration came in, he earned the reputation of being one of the most brilliant men of the opposition. On his father's death, in July, 1845, he took his seat in the house of lords as Earl Grey, and in the succeeding year was appointed secretary for the colonies in the administration of Lord John Russell. On his retirement with his colleagues in 1852, he published in two volumes a defence of his colonial policy, and in 1858 an "Essay on Parliamentary Government as to Reform" (2d ed., 1864).

GREY, Sir George, a British author, born at Lisburn, Ireland, in 1812. He was educated in the military college at Sandhurst. In 1837, being then a captain, he asked and received permission to explore the interior of Australia. In 1838, with another expedition, he explored the Swan river district. He returned to England in 1840, and in 1841 was appointed governor of South Australia, in 1846 of New Zealand, in 1854 of Cape Colony, and in 1861 again of New Zealand. He returned to England in 1867. He has published "Journals of Two Expeditions of Discovery in N. W. and W. Australia" (2 vols., London, 1841); "Polynesian Mythology and Ancient Traditional History of the New Zealand Race" (1855); and "Proverbial Sayings of the Ancestors of the New Zealand Race" (1858). He possessed a celebrated library, especially rich in geographical and ethnological works. Dr. H. J. Bleek published in 1859 a critical list of the works on African and Polynesian languages.

GREY, Lady Jane, a noble English lady, born at Bradgate, her father's estate in Leicestershire, in 1537, beheaded in the tower of London, Feb. 12, 1554. She was the great-grand-

daughter of Henry VII., whose daughter Mary, the young widow of Louis XII. of France, became the wife of Charles Brandon, duke of Suffolk. Their daughter, Lady Frances Brandon, was married to Henry Grey, marquis of Dorset, afterward duke of Suffolk. Lady Jane was the eldest of three daughters of this pair, who had no male issue. She suffered much rigorous treatment in childhood. Her remarkable talents early displayed themselves, and her parents placed her under the tutorship of John Aylmer, afterward bishop of London. At the age of 15 she spoke and wrote Greek, Latin, Italian, and French, with ease and correctness; she had also some knowledge of Hebrew, Chaldee, and Arabic. To these accomplishments (not entirely unusual to young ladies of the period) were added sweetness of disposition and piety of heart. Edward VI. was disposed to bequeath his crown to her in consequence of his aversion to the Catholic principles of his sister Mary, and of the impossibility of excluding this sister on the plea of illegitimacy, without also excluding Elizabeth on the same ground. The duke of Northumberland, knowing Edward's disposition, effected a marriage between Lady Jane and his own son, Lord Guilford Dudley. His machinations were otherwise so successful that Edward gave his final consent to the succession of the bride. Royal letters patent were signed and sealed, excluding Mary and Elizabeth, whose rights were affirmed by the will of Henry VIII., and settling the crown upon the heirs of the duchess of Suffolk. The king's health, which had languished for a year, from this time rapidly declined, his physicians being dismissed, and the royal patient committed to a creature of Northumberland. The duke did not communicate his plan to his daughter-in-law until July 10, 1553, four days after the king's death, when he visited her at Sion House, and approached her with the ceremony usual to royal state. She accepted the crown with great reluctance, yielding only to the entreaties of her husband and father. It was the custom that the first days of a new reign should be passed by the sovereign in the tower of London. Lady Jane Grey was accordingly conducted thither. She was proclaimed queen, but without the slightest manifestation of welcome by the people. Northumberland and Suffolk were so disliked that not even the horror with which the princess Mary was regarded by the Protestant party could diminish the popular ill feeling toward them. Mary had taken refuge with her friends in the north, and as soon as Edward's death was known the Catholics rose to her support in all directions, and she soon approached London with 12,000 men. The most considerable nobles and gentry declared for her without delay; and the duke of Suffolk, who had been appointed by Northumberland to command the army, could bring but little over 6,000 troops into the field. Northumberland, seeing the danger, and losing

all confidence in Suffolk, hastened to take the command in person. His departure from London was the signal for a general desertion of the cause. The mayor and council proclaimed Queen Mary. Even Suffolk deserted his hapless daughter, who, after the vain pageantry of ten days of royal state, would willingly have withdrawn to her private abode. Mary entered the capital in triumph. Northumberland, falling upon his knees, begged abjectly for life, but was executed with two of his most active adherents, Sir Thomas Palmer and Sir John Cate. Suffolk was set at liberty, and the queen would not consent to the death of Lady Jane, though urged by her ministers to do so. Sentence, however, was pronounced against her and her husband, without any immediate intention of putting it into execution, and they were confined in the tower. But in consequence of Wyatt's insurrection, in which Suffolk was mad enough to engage, Mary signed a warrant for their execution on Feb. 8, 1554. Dudley was beheaded on Tower hill; Jane, on account of her royal blood, was allowed to suffer within the precincts of the tower. She met her fate with calmness and piety, refusing to take leave of her husband, whom she hoped that day to meet in heaven.

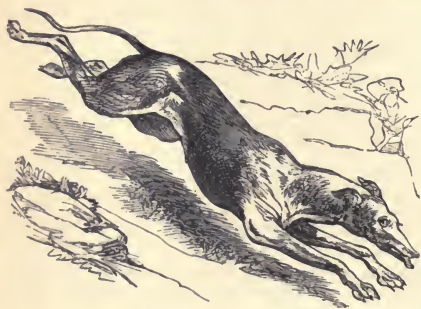
GREYHOUND (*canis venaticus*), a species of dog characterized by a narrow and sharp head, a nose greatly prolonged, and with its plane passing with little elevation nearly to the occiput, long neck, deep chest, arched loins, abdomen much drawn up, and buttocks elevated; the stature is high on account of the elongated and slender limbs; the ears are small, pointed, and semi-pendulous; the tail long and slender, and in the original races fringed. Representations of the greyhound are found on the oldest Egyptian monuments. The permanence and



Persian Greyhound.

peculiarities of the greyhound characters indicate that it arose from an aboriginal independent species, whose primitive seat was probably in the extensive plains of western Asia, extending from Hindostan and Persia through Tartary to Russia, where now the largest

breeds of the race exist, and whence they were carried by or followed man in his migrations into Egypt and Europe. The general colors are black, white, and slaty; the northern breeds have long and shaggy hair, while the southern are smooth or silky, from the effects of climate or from an original difference. The largest and fiercest greyhounds have long hair, like those of the Deccan and Persia, the former of which is of a yellowish tan color, and the latter slaty or white, the hair of both being rather soft; the Arabian greyhound, variously crossed, is large and strong. The Russian and Tartar breeds are large, rough, usually white, black clouded, with long hairy tails; the Scotch greyhound is of the same breed, but, from a probable cross with a staghound, has an excellent nose and considerable sagacity, with great speed and endurance; the Irish greyhound, the largest dog of western Europe, and more than a match for a wolf, is considered of the same breed with the last, crossed in various localities with the great Danish dog, the staghound, and the bloodhound; the Grecian greyhound, still extant, and used in deer



English Greyhound.

hunting, has a rather short and soft fur, slaty and white. Among the smooth-haired breeds are the Turkish, ashy, white, or brindled, with long hairy ears and very pointed nose; the Italian, small, elegant, very delicate, swift, and chiefly regarded as a lady's pet (there is a larger variety resembling this in the Barbary states); and the English greyhound, unrivalled in speed, beauty, and docility, used in the chase of the hare; the last is the most common in western Europe and in the United States. The lurcher (*C. vertagus*) was originally a greyhound, but, from mixture with other breeds and from want of care, has degenerated.

GREYTOWN. See SAN JUAN DE NIOARAGUA.

GRIBEAUVAL, Jean Baptiste Vaquette de, a French artilleryman, born in Amiens, Sept. 15, 1715, died in Paris, May 9, 1789. In 1732 he entered the royal regiment of artillery as a volunteer, in 1752 was sent by the government to study the Prussian system of artillery, and in 1757 was made lieutenant colonel. He now entered the service of Maria Theresa of Austria, and served during the seven years' war with

the rank of general, distinguishing himself especially in the defence of Schweidnitz. Returning to France, he was appointed in 1765 inspector of artillery, and in 1776 inspector general, and devoted the remainder of his life to the improvement of that branch of the service. (See ARTILLERY.) His principal work is *Réglement concernant les fontes et constructions de l'artillerie de France* (3 vols. fol., in 4 parts, with 125 plates, Paris, 1792). Only 125 copies for the use of the government were printed.

GRIDLEY. I. Jeremy, an American lawyer, born in Boston, Mass., March 10, 1702, died in Brookline, Sept. 10, 1767. He was educated at Harvard college, and was for a year editor of the "Weekly Rehearsal," a newspaper established in Boston in 1781. He soon acquired great reputation as a lawyer, and was appointed attorney general for the province of Massachusetts Bay. In 1761, while holding this office, he defended the writs of assistance which the Boston custom-house officers had applied for to enable them to enter at discretion the dwellings of suspected individuals. He was eminent for his classical attainments. **II. Richard,** an American soldier, brother of the preceding, born in Boston, Jan. 3, 1711, died in Stoughton, June 20, 1796. In 1745 he served as engineer at the siege of Louisburg, in 1755 was made chief engineer and colonel of infantry, and in the following year took part in the expedition to Crown Point under Winslow, and constructed the fortifications on Lake George. In 1758 he served under Amherst, and subsequently under Wolfe on the plains of Abraham. At the conclusion of the war he received Magdalen island and half pay as the reward of his services. On the outbreak of the revolutionary war he was appointed chief engineer, and constructed the fortifications on Breed's hill the night before the battle of June 17, 1775, in which he was wounded. He was commissioned major general in September, and commander of the continental artillery, but was superseded by Knox in November.

GRIESBACH, Johann Jakob, a German Biblical critic, born at Butzbach, Hesse-Darmstadt, Jan. 4, 1745, died in Jena, March 24, 1812. He was educated at Tübingen, Halle, and Leipsic, and devoted himself to the critical study of the original text of the New Testament. In 1773 he was made extraordinary professor of theology at Halle, and subsequently was elected a professor of divinity at the university of Jena, of which institution he became rector in 1780. The first edition of his Greek Testament was published at Halle in 1775-'7; the second was completed in 1806. Strictly speaking, this was the first critical edition of the New Testament. It was reprinted in London in 1809 and in 1818. An American edition was published in 1808.

GRIFFIN, a fabulous monster, half bird, half beast, that dwelt in the Rhippean mountains, and guarded the gold of the Hyperborean regions from the one-eyed Arimaspians. Griffins were also supposed to watch over the treasures

of India, and the fable probably originated in the East. The fabulists and poets of antiquity represent it with the body of a lion, the head and wings of an eagle, the ears of a horse, and a comb of fishes' fins.

GRIFFIN, Edward Dorr, an American divine, born in East Haddam, Conn., Jan. 6, 1770, died in Newark, N. J., Nov. 8, 1837. He graduated at Yale college in 1790, was licensed to preach in October, 1792, and in 1795 was settled as pastor of the Congregational church in New Hartford, Conn., from which in 1801 he was called to the first Presbyterian church in Newark, N. J., where he remained till 1809. In 1808 he was appointed professor of sacred rhetoric in Andover theological seminary, which office he filled till 1811, when he became pastor of Park street church, Boston. There he delivered a series of lectures in exposition of Calvinistic doctrines, afterward published under the title of "Park Street Lectures," and often reprinted. In 1815 he accepted a call to the second Presbyterian church in Newark. In 1821 he became president of Williams college, Mass., and devoted himself most successfully to its interests till 1836, when he resigned and removed again to Newark. Dr. Griffin was a vigorous writer and an eloquent preacher. His publications were numerous, consisting chiefly of sermons and addresses, a selection from which, with a memoir of his life by the Rev. Dr. Sprague, was published in 2 vols. in 1839, and an additional volume of sermons in 1844.

GRIFFIN, Gerald, an Irish novelist, born in Limerick, Dec. 12, 1803, died in Cork, June 12, 1840. When he was about 17 years of age his family emigrated to the United States, leaving him at Adare, near Limerick. Determining to devote himself to a literary career, he went in 1823 to London with "Aguire," a tragedy, composed two years previous, which he was unable to dispose of. Another called "Gisippus" (performed after the author's death at Drury Lane with complete success) proving equally unfortunate, he was forced to become a writer for the periodical press, and for several years lived in a precarious manner. He gradually acquired reputation as a brilliant magazine writer, and in 1827 published his "Holland-tide," which was followed shortly by "Tales of the Munster Festivals," both designed to illustrate the manners of the Irish peasantry. In 1828 appeared "The Colleen Bawn, or the Collegians," the most successful of his novels, "The Invasion," "The Rivals," "The Duke of Monmouth," &c. In 1838 he joined the society of the Christian brothers. He was likewise distinguished as a poet. His works have been published in New York in 10 vols., with a memoir by his brother.

GRIFFIN CITY, the capital of Spalding co., Georgia, at the junction of the Savannah, Griffin, and North Alabama railroad with the Macon and Western line, 35 m. S. of Atlanta; pop. in 1870, 3,421, of whom 1,588 were colored. It has a healthy situation, is well built,

and carries on an active trade. It has a female college, founded in 1848, a daily, a semi-weekly, and three weekly newspapers, a bank, and several churches.

GRIFFITH, William, an English physician, born in 1810, died in Malacca, Feb. 9, 1845. He was educated at the London university, in 1832 went out to India as assistant surgeon, and was appointed by the Bengal government to examine the botany of Tenasserim. In 1835 he was selected to accompany Dr. Wallich to Assam to report on the growth of the tea plant. In 1837 he accompanied Capt. Pemberton on his mission to Bootan, and was subsequently sent to examine the vegetable productions of Afghanistan. In 1841 he was placed on the medical staff at Malacca. He collected animals as well as plants, and his collections of birds alone numbered 600 specimens.

GRIJALVA, Juan de, a Spanish navigator, born at Cuellar in the latter part of the 15th century, slain by the Indians in Nicaragua, Jan. 21, 1527. He was intrusted by his uncle, Don Diego Velasquez, the first governor of Cuba, with the command of four vessels, which in the spring of 1518 sailed from Santiago de Cuba, to complete the discoveries which Fernandez de Cordova had made in Yucatan the preceding year. He coasted along the peninsula, and rounding it extended his explorations as far as the region of the Panuco, giving his name and that of his companion, Alvarado, to two rivers on the coast. His communication with the Aztecs was friendly, and so profitable that he was enabled to send back one of the ships freighted with gold, jewels, and other treasures. He afterward settled in Nicaragua, and was slain in the valley of Ulanchó.

GRILLPARZER, Franz, a German dramatist, born in Vienna, Jan. 15, 1791, died there, Jan. 20, 1872. He was from 1813 to 1856 director of the archives of the ministry of finance, and in 1861 became member for life of the Reichsrath. He was first brought into notice by *Die Ahnfrau*, a tragedy of the fatalistic school, produced in 1816. In 1819 he produced *Sappho*, in 1822 *Das goldene Vliess*, a fantastic work, and in 1825 *König Ottokar's Glück und Ende*. He also wrote comedies and lyrics. A collection of his works in 10 vols. was published in 1872 (2d ed., 1874), and his biography by Kuh in the same year. Early in life he became intimate in the family of Counsellor Fröhlich, after whose death he assumed the guardianship of his three daughters, with whom he resided till his death. At the public celebration of his 80th birthday he was made grand cross of the order of Francis Joseph.—See *Grillparzer als Archiv-Director*, by G. Wolf (Vienna, 1874).

GRIMALDI, one of the four great patrician families of Genoa. They derive their descent from Grimoald, mayor of the palace under the Frankish king Childebert II., and first made their appearance in northern Italy in the 10th century. In 980 they gained possession of the lordship of Monaco, of which they

remained the hereditary princes for upward of seven centuries. They belonged to the Guelph faction, and cooperated with the Fieschi in those incessant struggles with the Ghibellines, headed by the Doria and Spinola families, which kept Genoa in a turmoil; and notwithstanding the law of 1339 excluding the nobles, both Guelph and Ghibelline, from holding supreme authority in the state, they continued to exert the greatest influence in the government of their country. The Grimaldis possessed large estates in France and Italy. Branches of this family still exist in Nice and southern France. RANIERI II. was the first Genoese who led the fleet of the republic beyond the strait of Gibraltar. As an ally of Philip the Fair of France, he defeated in 1304 the Flemish fleet under Guy of Flanders, whom he took prisoner. CARLO II., surnamed the Great, commanded the Genoese crossbowmen in the battle of Crécy. His troops, rendered helpless by the damage which a heavy shower had caused to their bowstrings, were attacked not only by the English, but also by the French, who were enraged at the falling back of their allies, and a dreadful carnage ensued, in which their commander was killed (1346). ANTONIO, an admiral, in 1332 avenged the aggressions of the Catalonians and Aragonese by ravaging their coasts. The supremacy which the Genoese thus gained was maintained till 1353, when the combined Catalonian and Venetian fleets, under command of Nicolò Pisani, inflicted a disastrous defeat upon Grimaldi off the coast of Sardinia, by which the naval strength of Genoa was for a time prostrated. GIOVANNI, in the service of the Milanese, gained a decided victory over the Venetian fleet under Trevesani on the Po, in 1431, taking numbers of galleys and immense spoils. DOMENICO distinguished himself as a zealous churchman, and also as a naval commander at the battle of Lepanto (1571). He was advanced to the dignity of cardinal, and extirpated heretical doctrines from his diocese. GERONIMO, who died in 1685 at the age of 89, was also an ecclesiastic, and as bishop of Aix effected some very wholesome reforms in his diocese. He annually distributed 100,000 livres in alms. He was sent as nuncio to Germany by Urban VIII., who made him a cardinal.

GRIMES, an E. county of Texas, bounded W. by Navasoto and Brazos rivers; area, 902 sq. m.; pop. in 1870, 13,218, of whom 7,921 were colored. The surface is rolling and occupied by prairies and forests. Much of the soil is a rich black loam. The county is traversed by the Houston and Texas Central railroad. The chief productions in 1870 were 336,690 bushels of Indian corn, 80,966 of sweet potatoes, and 10,025 bales of cotton. There were 3,569 horses, 1,305 mules and asses, 5,779 milch cows, 4,765 working oxen, 17,814 other cattle, 3,794 sheep, and 15,913 swine; 3 saw mills, and 3 carriage factories. Capital, Anderson.

GRIMES, James Wilson, an American statesman, born in Deering, N. H., Oct. 20, 1816, died in Burlington, Iowa, Feb. 7, 1872. He graduated at Dartmouth college in 1836, and removed to Burlington, where he began the practice of law. He was a delegate to the first territorial legislature of Iowa in 1838, and held a seat in the state legislature for several terms. In 1854 he was the whig and freesoil candidate for governor, canvassed the state in person, and was elected, though his party had previously been in the minority. He held the office three years, and did much to secure liberal legislation in behalf of common schools and a better treatment of the insane. He was elected to the United States senate in 1859, and reelected in 1865. In the senate he was chairman of the committees on naval affairs and public lands, and a member of the special joint committee on the rebellious states. On the trial of President Johnson he was one of the few republican senators who voted for acquittal. In 1869, in consequence of a stroke of paralysis, he resigned his seat in the senate, and made a brief tour in Europe.

GRIMKÉ. I. Thomas Smith, an American lawyer and scholar, born in Charleston, S. C., Sept. 26, 1786, died near Columbus, O., Oct. 12, 1834. He graduated at Yale college in 1807, studied law in Charleston, and rose to eminence at the bar and in politics. Among his more noted efforts were a speech in the state senate on the tariff question in 1828, in which he supported the general government, and an argument on the constitutionality of the South Carolina test act in 1834. He became more widely known by his addresses in behalf of peace, religion, and literature. An early and prominent advocate of the American peace society, he held the opinion that even defensive warfare is wicked. He entertained some eccentric notions on the subject of education, and in several pamphlets he introduced a new system of English orthography. He published several addresses before Sunday schools and peace societies, before the society of the Cincinnati at Charleston, July 4, 1809, and before various societies and associations on subjects connected with education. A volume of his addresses was published at New Haven in 1831. **II. Frederick**, brother of the preceding, born in Charleston, S. C., Sept. 1, 1791, died March 8, 1863. He removed to Ohio, where he held for many years the office of judge of the court of common pleas and of the supreme court. He was the author of a work on "The Nature and Tendency of Free Institutions" (Cincinnati, 1848), and of an essay on "Ancient and Modern Literature." **III. Sarah Moore**, sister of the preceding, born in Charleston, S. C., Nov. 26, 1792, died at Hyde Park, Mass., Dec. 23, 1873. From early youth she and her younger sister Angelina felt a strong repugnance to slavery, and on receiving slaves by inheritance immediately set them free. About 1828 they removed to Philadelphia and joined

the society of Friends. In 1836 they began to lecture against slavery, and their addresses had great influence on public opinion. In 1837-'8 Sarah visited Massachusetts, making many public speeches, and wrote for Garrison's "Liberator" a series of letters on "The Equality of the Sexes," which were afterward published in a volume. In these letters all the principles and nearly all the arguments since advanced by the woman's rights party were anticipated. In the latter part of her life Miss Grinké was a teacher of French, and translated and published Lamartine's *Jeanne d'Arc* and Émile Souvestre's *Confessions d'un ouvrier*. Her sister became the wife of Theodore Dwight Weld. (See WELD.)

GRIMM, Friedrich Melchior, baron, a French critic, born in Ratisbon, Dec. 26, 1723, died in Gotha, Dec. 19, 1807. After distinguishing himself as a scholar at Leipsic, he accompanied Count Schönberg to Paris as tutor to his children. He soon afterward became reader to the prince of Saxe-Gotha, gained the acquaintance of J. J. Rousseau about 1749 by his taste for music, was introduced into the circle of the encyclopædists, and was made secretary successively of Count Friesen and of the duke of Orleans. He was noted for romantic and sentimental amours, and joined the coterie of critics who favored the Italian and assailed the French opera. He achieved his first literary success by a pamphlet entitled *Le petit prophète de Behmischbroda* (Paris, 1753), a plea in Biblical style for Italian music, which, together with several lively and enthusiastic critiques on the arts, gave him the reputation of one of the most brilliant French writers. Employed by the abbé Raynal to conduct his foreign correspondence, Grimm became the regular correspondent of seven royal personages, among whom were Catharine II. of Russia, Gustavus III. of Sweden, and Stanislas Poniatowski of Poland, chronicling for them the literary movements for which Paris was then distinguished. This correspondence, which gives a detailed history of French literature from 1753 to 1790, is one of the best collections of criticism of the 18th century. No important work appeared in France during that period which is not the subject of ingenious and piquant remarks. He was appointed in 1776 by the duke of Saxe-Gotha his envoy at the French court, and saw the outbreak of the French revolution and described its early scenes, but retired from Paris with the other members of the diplomatic corps, and passed his last years at Gotha, holding from 1795 the title of minister plenipotentiary of Russia. His *Correspondance littéraire, philosophique et critique* was published in Paris (16 vols., 1812-'13). A new edition, annotated by Taschereau (5 vols., 1829-'31), contains passages suppressed by the censorship under the Napoleonic régime. The *Correspondance inédite de Grimm et Diderot* appeared in 1829, and *Études sur Grimm*, by Sainte-Beuve and Paulin Limayrac, in 1854.

GRIMM. I. Jakob Ludwig, a German philologist, born in Hanau, Jan. 4, 1785, died in Berlin, Sept. 20, 1863. He studied law in the university of Marburg under Savigny, whom in 1805 he accompanied to Paris. In 1806 he returned to Hesse, was appointed secretary of war, and devoted his leisure to the literature of the middle ages. He participated in the congress of Vienna (1814-'15), and was sent to Paris by the Prussian government to obtain manuscripts carried thither by Napoleon. He was second librarian at Cassel from 1816 to 1830, when he became professor and librarian at Göttingen, and for seven years lectured on the antiquities of the German language, literature, and law. In 1837 he was one of the seven professors who signed the protest against the abolition of the constitution by the king of Hanover, for which he with most of the signers was deprived of his office and banished. He published a pamphlet on the subject entitled *Jakob Grimm über seine Entlassung* (Basel, 1838). In 1841 he was called to Berlin as member of the academy of sciences and as professor. He presided over the assemblies of German philologists held in Frankfurt in 1846 and in Lübeck in 1847, was a member of the Frankfort parliament of 1848, and participated in the gathering at Gotha in 1849, acting with the moderate liberal party. His first publication was *Ueber den altdeutschen Meistergesang* (Göttingen, 1811). It was followed by his *Deutsche Grammatik* (4 vols., 1819-'37), containing a history of the grammatical forms of all the Germanic dialects in the different eras of the language. His *Deutsche Rechtsalterthümer* (1828; new ed., 1854) recounts the poetical and fantastic customs which flourished among the Germans in the middle ages; and his *Deutsche Mythologie* (1835; 2d ed., 1843) is a complete discussion of the old gods of the North. His *Geschichte der deutschen Sprache* (2 vols., Leipsic, 1848; 2d ed., 1853) traces the ethnological affinities of the Germanic nations by comparative philology. Among his numerous other works are a collection of German proverbs, *Weisthümer* (4 vols., Göttingen, 1840-'63), and editions of various mediæval productions. He also published, in connection with his brother Wilhelm Karl, the German *Kinder- und Hausmärchen* (Berlin, 1812; often republished, and translated into English and French), one of the most popular collections of juvenile stories; *Altdeutsche Wälder* (3 vols., Cassel, 1813-'16); *Die Lieder der Alten Edda* (Berlin, 1815); *Deutsche Sagen* (2 vols., Berlin, 1816-'18); and *Irische Elfenmärchen* (Leipsic, 1826), founded on Croker's "Fairy Legends." In 1852 he and his brother commenced the publication of the *Deutsches Wörterbuch*, on a plan more elaborate and extensive than that of any dictionary of any modern language. It was intended to include every word employed in German literature from Luther to Goethe. He lived to complete three volumes and a part of the fourth, embrac-

cing but a small part of the alphabet. The completion of the work, his brother having died before him, was intrusted to Moritz Heyne, Rudolf Hildebrand, and Karl Weigand; and it is said that the brothers Grimm left sufficient materials to carry out the original plan in all its essential features. The first part of vol. iv., reaching to the word *Garten*, was published in Leipsic at the beginning of 1874. The work was completed nearly to the letter L, and it is expected that the whole will be ready about 1890. Since his death three volumes of his minor writings (*Kleinere Schriften*), including an autobiography, have been published. **II. Wilhelm Karl**, a German philologist, brother of the preceding, born in Hanau, Feb. 24, 1786, died in Berlin, Dec. 16, 1859. He was educated at Cassel and Marburg, was appointed in 1814 secretary of the library of Cassel, and in 1830 assistant librarian at Göttingen, where he became professor in 1835. He was deprived of this office in 1837, and accompanied his brother to Cassel and Berlin. He devoted himself especially to German mediæval poetry, and, besides the works which were the joint productions of the two brothers, wrote treatises *Ueber die deutschen Runen* (Göttingen, 1821) and *Ueber die deutschen Fingernamen* (Berlin, 1848); translated the *Altidänische Heldenlieder, Balladen und Märchen* (Heidelberg, 1811); and edited the *Grave Rudolf* (Göttingen, 1828), *Die deutsche Heldensage* (1829), *Der Freidank* (1834), *Der grosse Rosengarten* (1834), *Das Rolandlied* (1838), *Wernhers vom Niederrhein Veronica* (1839), *Konrads von Würzburg Goldene Schmiede* (Berlin, 1840), *Athis und Prophlias* (1846), *Ezhortatio ad Plebem Christianam* (1848), and *Altdeutsche Gespräche* (1851), for all of which he furnished introductions and disquisitions of great value. **III. Ludwig Emil**, a German painter and engraver, brother of the preceding, born in Hanau in 1790, died in Cassel, April 4, 1863. He studied under Karl Hess at Munich, served in the campaign of 1813, and in 1817 went to Italy. In 1832 he became professor in the academy of painting at Cassel. He made more than 130 engravings, most of them his own compositions. Of his paintings, a "Madonna" and numerous portraits are most admired. **IV. Hermann Friedrich**, son of Wilhelm Karl, born in Cassel, Jan. 6, 1828. He studied at Berlin and Bonn, and has since 1849 resided in the former city. Among his works are the drama *Arminius* (1851), the tragedy *Demetrius* (1854), the poem *Traum und Erwachen* (1854), *Novellen* (1856; 2d ed., 1862), *Essays* (1859), *Leben Michel Angelo's* (2 vols., 1860-'63; 3d ed., 1868; English translation by F. E. Bunnett, 2 vols., 1865), *Neue Essays* (1865), mainly devoted to the writings of Emerson, and the novel *Unüberwindliche Mächte* (3 vols., 1867). He has also edited *Ueber Künstler und Kunstwerke* (3 vols., 1865-'7).

GRIMMA, a town of Saxony, on the Mulde, 14 m. S. E. of Leipsic; pop. in 1871, 6,536. It is pleasantly situated, and contains several church-

es, an ancient town hall, and a royal palace which is used for public offices. Celebrated among its schools is the *Fürstenschule (Illustre Moldanum)*, with more than 120 pupils and a library of 6,000 volumes. Grimma was the most important commercial and manufacturing emporium of Saxony until the 14th century, but has considerably declined. The local industry has lately somewhat revived, and it also contains two large publishing houses. The *Golzermühle*, outside the town, includes an extensive manufactory of paper and machinery, and an iron foundry. Albert the Brave, progenitor of the Saxon dynasty, was born in the castle of Grimma in 1443.

GRINDAL, Edmund, an English prelate, born at Kensington, Cumberland, in 1519, died at Croydon, July 6, 1583. In 1459 he became president of Pembroke hall, Cambridge, and, having greatly distinguished himself as a preacher, became Bishop Ridley's private chaplain in 1550. The next year he was appointed chaplain to the king; but on the accession of Mary he fled to Strasburg, where he remained till her death, when returning, he was employed to draw up the new liturgy, and, with seven other Protestants, to oppose the Roman Catholic prelates in public debate. In 1559 he was made master of Pembroke hall, and the same year was nominated to succeed Bonner as bishop of London. In 1570 he was translated to the see of York, and five years after succeeded Parker as archbishop of Canterbury. Elizabeth, disliking the frequent meetings of the clergy for mutual improvement, directed Grindal to break up these "propheysings." Venturing decidedly to question the propriety of doing this, he was confined to his house by order of the star chamber, and his see was sequestered from him. He was afterward partially restored to his power and place, but in 1582 he became blind, and resigned his see, receiving a pension from the queen. He wrote little, but a tract of his on the real presence is printed in Fox's "Acts and Monuments."

GRINDELWALD, a village of Switzerland, in the canton and 36 m. S. E. of the city of Bern, and 10 m. E. S. E. of Interlaken, about 3,500 ft. above the sea, on the Bergelbach; pop. about 3,000. It is the centre of the road to the Bernese Oberland, and is celebrated for the scenery of the Grindelwald valley, the beauty of the passes of the Scheideck, and the surrounding mountains and glaciers. The village consists of picturesque wooden cottages widely scattered over the valley. The inhabitants are mainly employed in rearing cattle, in dairy work, and in preparing *Kirschwasser*. The most celebrated Swiss guides are natives of this vicinity. Owing to the proximity of the glaciers, the climate is cold and unsettled even in summer.—The Grindelwald valley is traversed by the Black Lütischine, and is about 16 m. long and 2 m. wide. South of the valley rise the Wellhorn, Wetterhorn, Mettenberg, Schreckhorn, Eiger, and Mönch; and north

the Faulhorn and other mountains. About 4 m. S. E. of the village the two glaciers of Grindelwald issue from both sides of the Mettenberg; they belong to the field of ice which occupies the table land and elevated valleys of the Bernese Alps. The upper one descends lower than any other glacier in Switzerland, being almost on a level with inhabited houses. It is accessible without danger, and the little or lower glacier is so easily explored that it is popularly known as the *Damengletscher* (lady's glacier).

GRINNELL, a town of Poweshiek co., Iowa, at the intersection of the Central railroad of Iowa with the Chicago, Rock Island, and Pacific line, about 50 m. E. by N. of Des Moines; pop. in 1870, 1,482. It is in a fertile undulating prairie, and is the seat of Iowa college (Congregational), originally established at Davenport. This institution was organized in 1848, and has a normal and English department, besides academic courses and a regular collegiate course. It possesses a valuable museum of natural history and extensive philosophical apparatus. The college and society libraries contain 6,500 volumes. In 1872-'3 there were 19 professors and 338 students.

GRINNELL LAND, a tract of land in the Arctic ocean, separated from Greenland by Kennedy channel and Robeson strait. Its discovery has been claimed by both English and American explorers. It was seen by the first American Grinnell expedition in search of Sir John Franklin, under Lieut. De Haven, Sept. 22, 1850, and eight months later was visited by Capt. Penny in the British vessel *Lady Franklin*. This officer, ignorant of its previous discovery, gave it the name of Prince Albert land. Dr. Kane, on his second expedition in 1854, explored and mapped it toward the west and north, in lon. 76° W., and as far N. as lat. 82°. Capt. Hall in 1871 sailed up its coast to lat. 82° 16', and his crew reported that its extreme N. point appeared to be about lat. 83° 20', whence the shore trended westward.

GRIGUAS, or **Baastards**, a mixed race of S. Africa, consisting of the progeny of Dutch settlers by Hottentot and Bush women. They occupy the right bank of the great bend of Gariep or Orange river, on the N. frontier of Cape Colony, and are supposed to number about 15,000 souls, most of whom profess Christianity and are partly civilized. They have a prosperous community at Griqua Town, about 500 m. N. E. of Cape Town, under the direction of the London missionary society. This place was the seat of a well known Christian chief named Waterboer, who managed during his reign of 30 years (about 1814-'44) to break up the marauding practices for which his people had been noted. The chiefs are elected. The people retain many of the characteristics of both African and European progenitors. The Christians of this race are generally well clad. Many of them are thriving agriculturists and cattle breeders.

GRISAR, Albert, a French composer, born in Antwerp, Dec. 26, 1808, died at Asnières, near Paris, June 14, 1869. He was sent to Liverpool to qualify himself for business pursuits, but left that city secretly and studied music in Paris under Reicha. The outbreak of the Belgian revolution soon obliged him to return to Antwerp, where he continued to practise his art, and his first productions, the ballad *La folle* and the comic opera *Mariage impossible*, made him famous and won from the Belgian government an allowance of 1,200 francs. He then took up his permanent residence in Paris. The best of his earlier comic operas, each in one act, are *L'Eau merveilleuse* (1844), *Gilles ravisseur* (1849), and *Bon soir, Monsieur Pantalón*. Among his later works, in three acts, are *Les amours du diable* (1853), *La chatte merveilleuse* (1862), and *Les bégayements de l'amour* (1864); but one of the most popular is the one-act piece *Le chien du jardinier*, first performed in 1855. He had *Afraya*, in three acts, *Rigolo*, in one act, and four other new operas nearly completed at the time of his death. His most popular ballad is *Adieu, beau rivage de France*.

GRISCOM. I. John, an American educator, born at Hancock's Bridge, Salem co., N. J., Sept. 27, 1774, died in Burlington, N. J., Feb. 26, 1852. He belonged to a family of Friends, passed his youth on a farm, and began to teach when but 17 years old. He studied for a time at the Friends' academy in Philadelphia, and afterward for 13 years had charge of the Friends' monthly meeting school in Burlington, during which time students were attracted thither from all the surrounding states. In 1807 he removed to New York, and taught there for 25 years. In 1818-'19 he travelled extensively in Europe, visiting the principal institutions of learning and charity, prisons, and manufactories, and in 1823 published "A Year in Europe" (2 vols.). He was one of the founders and for six years secretary of the society for the prevention of pauperism, and was the author of many of its reports. He was also the projector of the New York high school, which was under his supervision from 1825 to 1831. He was literary principal of a Friends' boarding school in Providence, R. I., from 1831 to 1835, when he removed to Burlington. In the last years of his life he reorganized the common school system of New Jersey. His biography, by his son John H. Griscom, was published in New York in 1859. **II. John Hoskins**, an American physician, son of the preceding, born in New York, Aug. 13, 1809, died there, April 28, 1874. He studied at the Rutgers medical college, New York, and at the university of Pennsylvania, where he graduated in 1832, his inaugural thesis being published by the faculty. In 1833 he was appointed assistant physician to the New York dispensary, and in 1834 chief physician. He was professor of chemistry in the New York college of pharmacy from 1836 to 1840. In 1843 he was appoint-

ed physician to the New York hospital, which post he held till 1867. He was for 15 years a member of the prison association, and for 10 years the chairman of its executive committee. He paid much attention to hygiene and the ventilation of buildings, and wrote several treatises upon these subjects. His principal works are: "Animal Mechanism and Physiology" (1839); "Sanitary Condition of the Laboring Classes of New York" (1844); "Uses and Abuses of Air, and the Means for the Ventilation of Buildings" (1850); "Hospital Hygiene" (1853); "A History, Chronological and Circumstantial, of the Visitations of the Yellow Fever in New York" (1858); "First Lessons in Physiology, with Brief Rules of Health, for the use of Schools" (1860); "Sanitary Legislation, Past, Present, and Future" (1861); and "Use of Tobacco, and the Evils resulting from it" (1868).

GRISEBACH, August Heinrich Rudolf, a German botanist, born in Hanover, April 17, 1814. He studied in Göttingen and Berlin, and became in 1837 adjunct and in 1847 regular professor of botany in the university of Göttingen. He published *Reise durch Rumelien und nach Brussa im Jahre 1839* (2 vols., Göttingen, 1841); and among his many botanical works is *Die Vegetation der Erde nach ihrer klimatischen Anordnung: ein Abriss der vergleichenden Geographie der Pflanzen* (2 vols., with a map, Leipzig, 1872). The author in this work gives a geographical description of plants in relation to the physical history of the earth.

GRISI, Giulia, an Italian singer, born in Milan in 1812, died in Berlin, Nov. 25, 1869. She was the daughter of Gaetano Grisi, who was an officer of engineers, and niece of the singer Grassini; and she was assisted in her musical studies by her elder sister Giuditta, who was also a celebrated singer. On her début in Bologna at the age of 17 she made a great impression by the grace and loveliness of her person, her intelligence, and fine vocal abilities. In 1832 she took the part of Adalgisa on the first representation of Bellini's *Norma* at Milan, and shared with Pasta, who personated Norma, the triumph of the occasion. She had previously entered into a contract with Lanari, the *impresario* at Florence, to sing for him for six years at a very moderate salary; but finding that her talents could command higher pay elsewhere, she secretly fled to France to avoid her obligations. In Paris, through the influence of Rossini, she was engaged as prima donna of the Italian opera; and in 1834 her début in London was very successful. In the parts of Norma, Semiramide, Lucrezia Borgia, and Elvira in *I Puritani*, she showed dramatic capacities which rendered her scarcely less attractive as an actress than as a singer; while in the buffo music of *Il barbiere di Siviglia*, *Don Pasquale*, or *Cenerentola*, she was almost equally successful. In August, 1854, in company with Signor Mario, she visited the United States. In 1836 she married in London M. de

Meley, but retained in her profession her former name. The marriage was unhappy and was judicially dissolved. Mme. Grisi subsequently married Mario.

GRISONS (Ger. *Graubünden*), the easternmost and largest of the Swiss cantons, bordering on Liechtenstein, Tyrol, Italy, and the cantons of St. Gall, Glarus, Ticino, and Uri; greatest length 90 m., greatest breadth 64 m.; area, 2,774 sq. m.; pop. in 1870, 91,782, of whom about 52,000 were Protestants. The whole canton is an alternation of valleys and mountains, several of the latter of which reach an elevation of from 10,000 to 13,000 ft. above the sea. Among the Alpine mountain passes are those of the Bernardino, Splügen, Julier, and Bernina; among the valleys is the Engadine. The scenery is surpassingly grand. The climate is more diversified than is usual even in Switzerland. While on the mountains winter reigns for more than half the year, the air of the vale below is almost as mild and genial as that of Italy. In the loftier districts the snow sometimes continues as late as July, but in the valleys which look toward the south cultivation can commence as early as the beginning of March. The principal rivers are the upper courses of the Rhine and Inn, and several tributaries of the upper Ticino and Adda. The chief productions are rye, barley, oats, timber, hemp, flax, potatoes, fruit, wine, cheese, and cattle; the rearing of the last constitutes the great business of the inhabitants. Iron, lead, and zinc are produced, but not extensively mined. There are no manufactures of importance, but a considerable transit trade is carried on through the canton between Italy and Germany. The annual value of exports is about 6,500,000 francs; of imports, 8,000,000. The canton is divided into three leagues, the *Graubund* (league of counts, or gray league), *Gotteshausbund* (league of God's house), and *Zehngerichtenbund* (league of ten jurisdictions), which are governed by their respective presidents and by a general diet of deputies from each *Bund*. They are subdivided into communes, each of which was formerly almost independent within its own limits. Of late centralization has made some progress; the cantonal government has received greater powers, and cantonal courts have taken the place of the former independent courts. As a canton the country is now divided into 14 districts, which are subdivided into circles. The name of the canton is said to be derived from the color of the dress worn by a band of the people who in 1424 met in a forest near Trons and bound themselves to defend each other against their feudal lords. Formerly Romansh was the language of the entire population; the first German settlers came into the country about 600 years ago, since which time the German language has steadily gained ground, until by the census of 1870 the number of German families was found to exceed the Romansh. Capital, Coire.

GRISSEH, or *Grissee*, a town of Java, 12 m. N. W. of the city of Surabaya, on the strait of Madura; pop. not stated, though believed to be numerous, and mainly consisting of Javanese and Chinese. The principal houses extending along the shore and are shaded by tamarind trees, and many of the residents are scattered over a large distance inland, but in a much less healthy locality. The finest buildings are a Chinese temple and the dwelling of the Dutch resident. The roadstead is the safest on that part of the Javanese coast, and ship building is actively carried on. Salt and saltpetre abound in the vicinity. It is one of the most ancient towns of Java; and here Mohammedanism was first firmly established.

GRISWOLD, Alexander Viets, a bishop of the Protestant Episcopal church in the United States, born in Simsbury, Conn., April 22, 1766, died in Boston, Mass., Feb. 15, 1843. His early education was mainly derived from his uncle, the Rev. Roger Viets, rector of the Episcopal church in Simsbury. Mr. Viets during the revolution sided with the royalists, and removed to Nova Scotia in 1787; but he was unable to persuade his nephew to go with him. After some hesitation between law and divinity, Mr. Griswold was ordained June 3, 1795. He entered at once upon a large field of labor, including East Plymouth, Harwinton, and Northfield, at the same time teaching a district school. In 1804 he accepted a call to Bristol, R. I., where he labored with much success. On the formation in 1810 of what was called the Eastern diocese, composed of New Hampshire, Vermont, Massachusetts, and Rhode Island, Dr. Griswold was elected bishop. At first he declined, not deeming himself qualified for the office; but his scruples having been removed, he was consecrated by Bishop White, May 29, 1811. He continued to hold the rectorship of the church in Bristol till 1830, when he removed to Salem, Mass. On Bishop White's death in 1836, he became presiding bishop. In June, 1838, the Rev. Dr. Alonzo Potter was elected his assistant, but declined. Dr. Eastburn of New York was elected in 1842, and his consecration, Dec. 29, was Bishop Griswold's last public act. He was highly esteemed for his meekness, soundness of judgment, and gentle, courteous demeanor. His publications were mostly sermons addressed to conventions of the church, and a volume of "Sermons on the most important Doctrines and Duties of the Christian Religion" (8vo, 1830).—A "Life" of Bishop Griswold was written by the Rev. J. S. Stone, D. D.

GRISWOLD, Rufus Wilmot, an American author, born in Benson, Rutland co., Vt., Feb. 15, 1815, died in New York, Aug. 27, 1857. A great part of his early life was spent in roaming about the world. He had learned the printing trade, which he followed for some time, and afterward studied divinity and became a Baptist preacher. He soon became associated in the editorship of literary periodicals in Boston,

New York, and Philadelphia, among which were the "New Yorker," "Brother Jonathan," and "New World." In 1841 he published a volume of poems and one of sermons, the former anonymously. In 1842 and 1843 he edited "Graham's Magazine" in Philadelphia, and in 1850 he projected the "International Magazine," published in New York, and edited by him till April, 1852. The works by which he is chiefly known are collections of specimens from American authors, accompanied by memoirs and critical remarks. The first of these was the "Poets and Poetry of America" (Philadelphia, 1842; 17th ed., 1856). It was followed by the "Prose Writers of America" (Philadelphia, 1846; 4th ed., 1856), and by the "Female Poets of America" (Philadelphia, 1849; 5th ed., 1857; new ed. by R. H. Stoddard, 1874). Mr. Griswold also edited the "Sacred Poets of England and America" (1849), and the "Poets and Poetry of England in the Nineteenth Century" (4th ed., 1854). His other principal publications are "Curiosities of American Literature," published as an appendix to Disraeli's "Curiosities of Literature," two series of biographies, "Washington and the Generals of the American Revolution," in conjunction with W. G. Simms, E. D. Ingraham, and others (2 vols., 1847), and "Napoleon and the Marshals of the Empire," in conjunction with H. B. Wallace (2 vols., 1847); and "The Republican Court, or American Society in the Days of Washington" (New York, 1854).

GRITTI. I. Andrea, doge of Venice, born in 1454, died Dec. 28, 1538. During the war against the league of Cambrai he led the armies of the republic against the imperialists, whom he at first defeated and drove out of Padua and Vicenza. In 1512 he regained Brescia and Bergamo from the French, but was shortly after defeated and made prisoner by Gaston de Foix, who took him to Paris. During his imprisonment he formed an alliance between France and the Venetian republic, and on his return to Venice he coöperated with French troops in driving the imperialists out of Brescia and overrunning the kingdom of Naples. In May, 1523, he was elected doge, and filled that office until his death. **II. Luigi**, an adventurer in the service of the Turks, son of the preceding by a Turkish slave, born in Constantinople in 1501, while his father was ambassador there, died in Transylvania, Sept. 28, 1534. He was educated at Padua, but finding no honorable employment open to him in Italy, he went to Constantinople, ingratiated himself with the grand vizier, and became a favorite with Solymán II., who intrusted him with diplomatic missions to various nations. He persuaded his master to support the claims of John Zápolya to the throne of Hungary, and took part in the attack on Vienna in 1529. After the coronation of Zápolya at Buda, Gritti was appointed governor general of Hungary, but abused his power by a bloody persecution of his enemies. The murder of the vicar of the

bishopric of Grosswardein and governor of Transylvania finally aroused the indignation of the people of that province, who marched against him with an overpowering force, besieged him in Mediasch, and put him to death.

GROAT (Dan. *groot*, Ger. *gross*, great), an old English silver coin, of the value of four pence (originally about equal to the present shilling), first struck under Edward III. about 1351, and so named because it was the greatest silver coin then in use, none having been previously struck of value over a penny. The *grot*, *groot*, and *groschen* are silver coins or moneys of account on the continent of Europe.

GRODNO. I. A government of European Russia, in Lithuania, formerly a part of Poland, bordering on Wilna, Minsk, Volhynia, and the kingdom of Poland; area, 14,960 sq. m.; pop. in 1867, 958,852, the large majority of whom are Roman Catholics. The surface is generally level, and a great portion of it is covered with pine forests and swamps. The principal productions are rye, barley, timber, hops, hemp, flax, fruit, honey, and cattle. The most important minerals are iron, chalk, limestone, and nitre. The forests abound with wild boars, wolves, bears, elk, and roebucks. The manufactures consist for the most part of woollen stuffs, hats, and leather. The chief rivers are the Niemen, Bug, Narew, and Pripetz. The principal towns are Grodno, Novogrodek, and Slonim. **II.** A city, capital of the government, on the right bank of the Niemen, 93 m. S. W. of Wilna; pop. in 1867, 24,789, among whom are many Jews. It has several Roman Catholic and Greek churches, a Lutheran church, two synagogues, an academy of medicine, a gymnasium, a military school for young noblemen, several other educational institutions, and manufactories of cloth, silk, and cotton. After 1673 every third Polish diet was held here, and in 1793 the Polish diet was here forced to assent to the second division of Poland.

GRONINGEN. I. A N. E. province of the Netherlands, bordering on the North sea and the estuary of the Ems, Prussia, and the provinces of Drenthe and Friesland; area, 885 sq. m.; pop. in 1870, 234,903. The surface is generally level, and in some places marshy. The climate is humid and unhealthy. The soil is very fertile, and is watered by numerous rivers and canals. The productions are corn, potatoes, butter, cheese, coal, flax seed, honey, wool, seeds, fruits, pigs, and cattle, which form the great exports from the province. It is divided into the districts of Groningen, Winschoten, and Appingadam. **II.** A city, capital of the province, at the junction of the Aa and the Hunse, 92 m. N. E. of Amsterdam; pop. in 1870, 38,258. The streets are traversed by canals, bordered with trees and crossed by 18 bridges. The principal public edifice is the province house, a large Gothic structure completed in 1810. It has a university which was established in 1614, academies of design, of

architecture, and of navigation, several learned associations, manufactories of paper, brushes, linen, and woollens, and a considerable trade in corn, butter, cheese, cattle, and wool. About 600 vessels arrive at and leave the port annually. Canals connect the town with the Dollart and the Zuyder Zee.—Groningen appears as a village in the 9th century, when the surrounding territory belonged to Friesland. In the 10th century it was annexed to the German empire, and was subsequently governed by imperial burgraves. Having become a free city, it joined the Hanse league. Maximilian I. bestowed the hereditary governorship of the city and country on the dukes of Saxony. The people revolted, and after a struggle placed themselves under the protection of the duke of Gelderland, who subsequently became a vassal of Charles V. The province joined the league of Utrecht in 1579. The capital was repeatedly besieged during the Dutch war of independence, Maurice of Nassau capturing it in 1594.

GRONOVIVS, the Latinized form of Gronov, the name of a German family settled in Holland. **I. John Frederick**, born in Hamburg, Sept. 8, 1611, died in Leyden, Dec. 28, 1671. He was educated at Leipsic and Jena, and studied law at Altorf. In 1634 he became a private tutor in Amsterdam, but three years later he gave up all other pursuits for the study of antiquities and the classics. He spent much time in England, France, and Italy, studying old manuscripts and rare books. In 1643 he was appointed rector of the gymnasium of Deventer, and in 1658 professor of belles-lettres at Leyden. He published annotated editions of Livy, Tacitus, Seneca, Sallust, Pliny, and other classical writers, and numerous essays on philology and antiquities. **II. Jacobus**, his eldest son, born in Deventer, Oct. 20, 1645, died in Leyden, Oct. 21, 1716. In 1668 he visited Oxford and Cambridge to study antiquities, and in 1672 went to Madrid as a member of the embassy from the states general. He was for two years professor of belles-lettres in the university of Pisa, and from 1679 in Leyden. He published editions of many of the classical writers, but is best known by his *Thesaurus Antiquitatum Græcarum* (13 vols. fol., Leyden, 1697-1702). **III. Abraham**, son of the preceding, born in Leyden in 1694, died there, Aug. 17, 1775. He practised medicine successfully in England and in Holland, but finally became librarian to the university of Leyden. He published editions of Justin, Pomponius Mela, and Tacitus, and several works exhibiting much classical erudition. **IV. John Frederick**, brother of the preceding, born in Leyden, March 10, 1690, died there in 1760. He studied jurisprudence and was a magistrate of Leyden, but devoted himself to botany, and was intimate with Linnæus. Among his works are *Flora Virginica* (1743), and *Flora Orientalis* (1755). **V. Laurentius Theodorus**, a naturalist, son of the preceding, born in Leyden in 1730,

died there in 1778. He published *Bibliotheca Regni Animalis* (4to, 1740), *Museum Ichthyologicum* (2 vols. fol., 1754-'6), and *Zoophylacium Gronovianum* (fol., 1763-'81).

GROOT, Gerhard, or Gerard the Great, founder of the congregation of "Brethren and Clerks of the Common Life," born in Deventer, Holland, in 1340, died Aug. 20, 1384. He studied in Paris, graduated master of arts at the age of 18, and taught philosophy and theology at Cologne, where his eloquence and learning gained him the surname of Magnus. Although not in priestly orders, he held several rich benefices, besides a considerable patrimony, and lived in great luxury until an interview with the prior of a Carthusian monastery at Geldern induced him to enter the religious state. He renounced his benefices, and after three years was ordained deacon, refusing higher advancement. He now passed through the principal cities of the diocese of Utrecht, preaching with extraordinary effect to immense audiences, and working reforms no less among the clergy than among the laity. He assailed scholastic theology, taught that the reading of the Scriptures and of the writings of the fathers should be one of the chief occupations of a Christian, and translated the Psalms and the church office into Dutch. Having collected some of the best manuscript copies of the Bible and the fathers, he established in his own house at Deventer a society whose principal employment was the transcribing of these books. He gave them a rule of life, prescribed community of goods, and placed over them Florent Radewyn, professor in the university of Prague, a rich man who had been converted by Gerhard's preaching. The "Brethren and Clerks of the Common Life," as the associates were called, became immensely popular. In a short time they counted 100 communities, among which there were some of women. They encountered great opposition from the mendicant orders, who sought to identify them with the Beguins, and also from the "Brethren of the Free Spirit;" but Gerhard defended himself with great skill, and obtained the formal sanction of Gregory XI. in 1376. During a visit to Ruysbroek he resolved to give to his order the rule of the canons regular, and shortly afterward on his deathbed recommended this change to Radewyn. The first monastery of canons regular was established in 1386 at Windesheim near Zwolle, and the order, thenceforward bearing the name of Windesheim, numbered in 1460 upward of 150 monasteries. The corrected text of the Bible published at Windesheim, from collated manuscripts of the version of St. Jerome, was approved by the popes and used as a chief authority in the edition of Sixtus V. The school of Deventer belonging to this order produced Thomas à Kempis, the reputed author of the "Imitation of Christ."

GROS, Antoine Jean, baron, a French painter, born in Paris, March 16, 1771, died about June 25, 1835. He was educated in the school of

David. "Bonaparte on the Bridge of Arcole," painted in 1801, first brought him into notice; but the "Plague at Jaffa," with Napoleon visiting the sick, exhibited in 1804, excited an extraordinary enthusiasm. The artist was placed at the head of living painters, and his picture was crowned with wreaths of palm. Gros next painted in rapid succession, and in a similar manner, immense pictures of the "Battle of Aboukir," the "Battle of the Pyramids," "Napoleon visiting the Field of Eylau after the Battle," the "Battle of Wagram," and other subjects suggested by events of the first empire. In France his chief work is considered to be the cupola of Ste. Geneviève at Paris, begun in 1811, exhibiting the saint protecting the throne of France, represented by Clovis, Charlemagne, St. Louis, and Louis XVIII. The picture covers an immense space, and is correct in design, but defective in color and expression. The artist received for it 150,000 francs, and the title of baron. Toward the close of his life his style deteriorated so greatly that his pictures were very severely criticised. He made a last attempt to compete with the new romantic school in his "Hercules and Diomedes;" failing in which, he closed his studio, exclaiming "that he knew no misfortune greater than to survive oneself." Soon after his body was found in the Seine near Meudon. It was supposed that he drowned himself in a fit of temporary insanity.

GROS, Jean Baptiste Louis, baron, a French diplomatist, born at Ivry-sur-Seine, Feb. 8, 1793. He entered the diplomatic service in 1823, was made a baron in 1829, and became secretary of legation in Mexico, and in 1834 chargé d'affaires at Bogotá. Afterward employed in various missions in South America, he distinguished himself by his tact in the settlement of the complications with the La Plata states. In 1849 he went to London to reconcile the English cabinet with the French expedition to Rome. The delicate question in respect to the Franco-Spanish boundary, which had been in abeyance for several centuries, was satisfactorily settled by him, after protracted negotiations at the convention of Bayonne, Dec. 2, 1856. In 1857 he was appointed ambassador extraordinary to China, where he cooperated with Lord Elgin during the capture of Canton and in the government of that city. He signed a treaty of peace with China at Tientsin in June, 1858, and on Nov. 6 a treaty of commerce and amity with Japan. He participated in the final operations of the French and English expedition on the Pei-ho against China in August, 1860, and in the conclusion of another treaty of peace (Oct. 25). In November, 1862, he became ambassador in London, but retired from the service in October, 1863.

GROSBEAK, the name of many conirostral birds of the finch family, and subfamily *coccothraustina* and *spizina*, or hawfinches, found in all parts of the world. One of the handsomest of the American species is the pine gros-

beak (*pinicola Canadensis*, Cab.), classed by Gray among the bullfinches. In this genus the bill is short, stout, and much curved, and the base of the upper mandible nearly concealed by bristly feathers; the wings moderate, the second and third quills the longest; the tail shorter than the wings, broad and nearly even; tarsi as long as the middle toe, strongly scutellated, and the claws long and sharp. The length of the pine grosbeak is $8\frac{1}{2}$ in., and the extent of wings 14; the bill and legs are black; the general color of the plumage is bright carmine, with grayish brown centres to the feathers of the back; the loreal region, lower jaw, sides, and lower parts, light gray; wings blackish brown, with two white bands, the outer edge of the quills also white. The female is ash-gray and brownish above, with yellow tinges below, and on the head, rump, and upper tail coverts; the young resemble the female, but are browner. This bird inhabits arctic America, coming as far south as Pennsylvania in severe winters. It is a charming songster, singing toward sunset, and in captivity during the night; it is easily kept in cages, and will eat most kinds of seeds, berries, and fruits, becoming very familiar; in its wild state it feeds on the buds and seeds of various trees, especially of the firs. The flight is undulating and direct, and they alight on the topmost branches, from which they gradually descend; they are not shy, and are easily approached, especially while bathing. The nest is made of sticks, at a small distance from the ground, and lined with feathers; the eggs are generally four, and white. Other species are found in the pine forests of Europe and Asia;

long and pointed; the tail short, and its feathers narrow; the length is 8 in. The anterior half of the body is yellowish olive; outer scapulars, band over eye, axillaries, and middle under wing coverts, yellow; crown, tibiae, wings, upper tail coverts, and tail, black. It is found in the northwest as far east as Sault Ste. Marie, and on the Pacific coast, especially about the Columbia river; from its abundance in the northern maple groves, it is called by the Indians sugar bird. The habits are those of the preceding species; they are noisy all day, and not in the evening only, as their name would indicate; their notes are harsh and screaming. The females have the head and back brownish, with yellowish ash rump, upper tail coverts spotted with white, and less white on the wings.—The rose-breasted grosbeak (*guiraca Ludoviciana*, Swains.) has a very thick, slightly arched bill, pointed wings longer than the even tail, and the tarsi shorter than the middle toe. The length is $8\frac{1}{2}$ in.; the general color above is glossy black, with the breast, axillaries, and under wing coverts carmine; the rest of lower parts, rump, upper tail coverts, middle wing coverts, spots on the wings, base of primaries and secondaries, and patch on the end of the inner webs of the outer three tail feathers, pure white. The female is brownish above, with yellowish marks and tinges. Its song is soft, clear, and sweet, and in captivity prolonged into the night. It is found in the eastern states, as far west as Missouri, and south to Guatemala; it feeds on young and tender buds and seeds. Other species are the black-headed grosbeak (*G. melanocephala*, Swains.), found on the high central plains from Yellowstone river to the Pacific and on the table lands of Mexico, and the blue grosbeak (*G. caerulescens*, Linn.), found in the southern states and across the continent.—For the cardinal grosbeak, see CARDINAL BIRD.

GROSE, Francis, an English antiquary, born at Greenford, Middlesex, in 1731, died in Dublin, May 6, 1791. His first work, "Views of Antiquities in England and Wales," came out in numbers, and was completed in 1787. In 1789 he went to Scotland to illustrate the antiquities of that kingdom. The first number of his work on this subject appeared in 1790. While in Scotland he became acquainted with Burns, who celebrated his convivial qualities in two ballads. Grose had few qualifications for an antiquary, but produced a number of works besides those above mentioned, the chief of which are: "Guide to Health, Beauty, Riches, and Honor" (London, 1783); "Classical Dictionary of the Vulgar Tongue" (1785); "Treatise on Ancient Armor and Weapons" (4to, 1785, to which he added a supplement in 1789); "Provincial Glossary" (1787); "Military Antiquities" (2 vols. 4to, 1786-8); "Rules for Drawing Caricatures" (1788).

GROSEILLIERS, Médard Chouart de, a French explorer of the 17th century. He was an early emigrant to Canada, where he married the daughter of Abraham Martin, king's pilot.



Evening Grosbeak (*Hesperiphona vespertina*).

1. Male. 2. Female.

the *P. enucleator* of Europe is smaller with a less stout bill, narrower tail, and less white on the wings.—The evening grosbeak (*hesperiphona vespertina*, Bonap.) is characterized by an enormous vaulted bill, of a greenish yellow color, much curved at the tip; the wings are

About 1660 he penetrated westward to the territory of the Sioux. He made his way from Lake Assiniboine to James bay, and, failing to induce Quebec merchants to occupy Hudson bay, went to England, and in 1663 led thither an English vessel commanded by Gillam, a New Englander. He subsequently returned to the French service and aided to break up the English posts in the bay, which he explored, naming the rivers that flow into it.

GROSS, Samuel D., an American surgeon, born in Northampton co., Pa., July 8, 1805. He received his medical degree in 1828, and began practice in Philadelphia, devoting his leisure to study and to the translation of French and German medical works, as Hollard's "General Anatomy," Hatin's "Manual of Obstetrics," Hildenbrand on "Typhus Fever," and Tavernier's "Operative Surgery." His first original work was a treatise on the "Diseases and Injuries of the Bones and Joints" (1830). In this occurs the first account of the use of adhesive plaster as a means of extension in the treatment of fractures. In 1833 he became demonstrator of anatomy in the medical college of Ohio, and removed to Cincinnati; and in 1835 he became professor of pathological anatomy in the medical department of the Cincinnati college, where he delivered the first systematic course of lectures on morbid anatomy that had ever been given in this country, and composed the first systematic treatise on the subject ever published in the United States, "Elements of Pathological Anatomy" (2 vols. 8vo, Boston, 1839; 3d ed., 1857). In 1840 Dr. Gross removed to Louisville, Ky., having been elected professor of surgery in the university of that city. In 1850 he accepted the professorship of surgery in the university of New York, but at the end of the session returned to Kentucky, where he was soon restored to his chair. In 1856 he was called to Jefferson medical college in Philadelphia. Dr. Gross was chosen president of the American medical association in 1867, and in 1870 presided over the teachers' convention at Washington for the improvement of medical education. He is a member of many American and European societies, and has received the degree of LL. D. from Jefferson college of Pennsylvania, and that of D. C. L. from Oxford university (1872). Besides the works already mentioned, he is the author of a monograph on "Wounds of the Intestines" (1843); "Foreign Bodies in the Air Passages" (1850); "Diseases, Injuries, and Malformations of the Urinary Organs" (1851); "Report on the Causes which retard the Progress of American Medical Literature" (1856); "System of Surgery, Pathological, Diagnostic, Therapeutic, and Operative" (2 vols. 8vo, 1859; 3d ed., revised, 1864; translated into French, Dutch, and Russian); "Lives of Eminent American Physicians and Surgeons," and "Manual of Military Surgery" (1861). In conjunction with Dr. T. G. Richardson, he founded and for five years ed-

ited the "North American Medico-Chirurgical Review."

GROSSE, Julius Waldemar, a German poet, born in Erfurt, April 25, 1828. He studied at Magdeburg and Halle, and devoted himself to art at Munich, but became a journalist, and in 1870 secretary of the Schiller institution at Weimar. He has published many novels, dramas, and poems. Among the novels are *Maria Mancini* (2 vols., Stuttgart, 1869; 2d ed., 1871), *Ein Revolutionär* (1869; 2d ed., 1871), and *Der neue Abälard* (Leipsic, 1871). His *Gesammelte dramatische Werke* appeared in Leipsic in 1870, in 7 vols., and a complete edition of his poems, including the exquisite piece *Das Mädchen von Capri*, in Berlin in 1871 *et seq.* He published a volume of patriotic poems, *Wider Frankreich*, in 1870.

GROSSEHAIN, or **Hain**, a town of Saxony, on the Röder, 18 m. N. N. W. of Dresden; pop. in 1871, 10,438. It has pleasant gardens, several churches, many schools, and extensive manufactories of cloth, cotton, prints, &c. The town was strongly fortified in the middle ages, when it belonged to Bohemia. A great fire broke out July 6, 1540, in a nunnery, said to have been the work of the inmates, who were incensed by the proposed abolition of the institution; and the conflagration consumed the greater part of the town, and also the castle, which was afterward rebuilt, and is now used as a manufactory. After great vicissitudes during the thirty years' war, and in the war with Sweden, it was desolated by another fire, July 8, 1744, which spared only about 40 houses. The town has gradually recovered from its misfortunes, and its population and industry are steadily increasing.

GROSSETESTE, Gresham, or **Gronthead** (Lat. **CAPITO**), **Robert**, a British theologian, born at Stradbroke, Suffolk, about 1175, died at Buckden, Oct. 9, 1253. He was educated first at Oxford and Paris, became a professor in the latter university, was appointed archdeacon of Chester in 1210, and was successively archdeacon of Wilts, Northampton, and Leicester, prebendary of Clifton, lecturer on divinity in the first Franciscan school at Oxford, and chancellor of the university (*rector scholarum*). In 1232 he resigned all his preferments except the prebend of Clifton, and wrote a work in defence of the Jews. In 1235 he was consecrated bishop of Lincoln, and opened in his residence a school for young noblemen, for whom he composed the book entitled *De Moribus Pueri ad Mensam*. He removed all scandalous and inefficient pastors, and refused institution to pluralists, to clergymen employed in courts of judicature or in the collection of the revenue, and to all who were unable to reside on their benefices. Besides the harassing and expensive lawsuits arising from his reforms, he was compelled to go to Rome in 1245 to plead his own cause against the complaints of his chapter, sustained by Boniface, archbishop of Canterbury. He succeeded there, and after his re-

turn to England his chapter submitted, and he visited the convents and monasteries, deposing negligent or inefficient superiors, and enforcing the observance of monastic rules. He opposed the royal extravagance and favoritism, contended in parliament against the exactions of the king, and resisted the intrusion of foreigners into English livings. On a second visit to Lyons in 1250, he presented to Innocent IV. a memorial on the evils of the church, which the pope ordered to be read in the consistory of cardinals. Returning to England, Robert was dissuaded by his friend Adam de Marisco from resigning his bishopric, and soon afterward he refused to induct into a rich benefice an Italian ignorant of English, while he excommunicated an unworthy nominee of the king's, and placed an interdiction on the church to which he had been nominated. In the parliament of London, Oct. 13, 1252, the king having presented a demand for a new subsidy, backed by a papal bull, Grosseteste united the entire body of the clergy in opposition to it. He also addressed an appeal to the lords and commonalty to suppress by statute the appointment of foreigners to preferment within the kingdom. One of his last acts was to refuse carrying out a provision sent him by the nuncio, promoting to a prebend in the church of Lincoln Frederick of Louvain, the nephew of Innocent IV. The story, says Lingard, that Grosseteste died under an ecclesiastical sentence rests on questionable authority. The catalogue of his works contains treatises on almost every branch of science; it fills 23 closely printed quarto pages in Pegge's "Life of Grosseteste" (4to, London, 1793). No complete collection of his works exists. Among the principal are: *Ruperti Lincolnensis Opuscula dignissima* (fol., Venice, 1514); *Compendium Sphære Mundi* (Augsburg, 1483; fol., Venice, 1518; and several other editions; translated into English); "Testament of the XII. Patriarchs" (12mo, London, 1577, with woodcuts; several times reprinted); "A Treatise of Husbandry," or "The Buke of Husbandry," according to Wynkin de Worde's edition; *De Cessatione Legalium* (4to, London, 1652; 2d ed., 8vo, 1658); "Castell of Love," edited by Weymouth (1864); and "Letters and Treatises," edited by H. R. Luard (1862). A life in Latin verse by Ricardus Barderiensis is to be found in Wharton's *Anglia Sacra*, vol. ii. See also his "Life and Times," by G. G. Perry (London, 1871).

GROSSETO. I. A province of central Italy, in Tuscany, bounded W. by the Mediterranean; area, 1,712 sq. m.; pop. in 1872, 107,457. The most important river is the Ombrone. It is the least productive province of Tuscany, the soil consisting partly of sterile mountain, partly of marshes, and only a small portion of it being capable of cultivation. Both agriculture and manufactures are unimportant. Among the chief products are sugar, lumber, coal, and potash. II. A town, capital of the province, in the plain of the Ombrone, 70 m. S. by W.

of Florence; pop. about 6,500. It is the seat of a bishop, and has a large cathedral and an artesian well. During summer most of the inhabitants leave the town to escape the exhalations of the Maremma.

GROSS-GLOGAU. See GLOGAU.

GROSSWARDEIN (Hungarian, *Nagy-Várad*), a town of Hungary, in the county of Bihar, on the Swift Körös, in a beautiful but somewhat marshy plain on a branch of the Pesh and Debreczin railway, 134 m. E. by S. of Pesh; pop. in 1870, 28,698. It is the seat of a Roman Catholic and a Greek Catholic bishop, has 16 Catholic, two Greek, and three Protestant churches, several convents, a Greek Catholic diocesan seminary, an academy of law, a gymnasium, two normal schools, several orphan houses and other charitable institutions, and several distilleries. The peace between John Zápolya and Ferdinand I. was concluded here in 1538. In the neighborhood is the watering place Hajó.

GROS VENTRES (Fr., Big Bellies), a name applied to two Indian tribes of different origin: 1, the Gros Ventres of the Missouri, or Minnetaries (see MINNETARIES); 2, the Gros Ventres of the prairies. The latter tribe, dwelling between the Milk and Missouri rivers, are a part of the Arrapahoes. They say that they came from the north and joined the Arrapahoes only temporarily; but the language is said to be the same, showing a common origin. Their separation from the Arrapahoes took place early in this century according to some, or at the beginning of the last century according to others. Wandering eastward, they met and fought the Sioux and then struck north. They next joined the Crows, but were plundered by that tribe, who killed many, carrying off their women and arms. Then they wandered for several years, plundering trading-posts at the north, but were driven off by the Kootenais, and finally, about 1824, settled near Milk river, where the Blackfeet in a manner adopted them, giving them horses. The traders supplied guns and ammunition. They soon became wealthy, as well as very independent and hostile to the whites. About 1830 they were estimated at 430 lodges, containing nearly 3,000 souls. Attempts were made by Father De Smet and other Jesuits to Christianize them as early as 1846, but with little success. Treaties were made with them at Fort Laramie in September, 1851, at the Judith in 1853 and in October, 1855, and at Fort Benton in November, 1865, some of which were never ratified. The Gros Ventres have remained peaceful since the treaties. In 1854 they became hostile to the Blackfeet, who had murdered and robbed a Gros Ventre. In 1862, with the Crows, they made war on the Piegiens, a Blackfoot tribe; but peace was made between them by Agent Upton at Fort Benton in February, 1864. They soon after lost severely by measles, and in 1867, having again gone to war with the Piegiens, were defeated near Cypress mountains with a loss of

300 men, nearly all their horses and many of their women and children being taken. The next year they ceded their lands for an annuity of \$35,000 in goods, by a treaty which was not immediately ratified, although they were placed on a reservation on Milk river with a part of the Crows. In 1870 their numbers were reduced to 1,300 by smallpox, and they were plundered by the Sioux, who killed many of their people. They were then joined by their kindred the Arrapahoes, and by the northern Cheyennes, who wished to reside permanently with them. The greatest chief of later days was Farmasee or Sitting Squaw, a tall, athletic man, the bravest of his tribe and a great friend to the whites. They are divided into bands, each under a hereditary chief or a band leader chosen for his valor. They have comfortable lodges built by their women, large enough to accommodate 100 persons. One part is assigned to their horses, dogs, cattle, and chickens, while another is for sleeping apartments. The Gros Ventres now occupy a portion of the Blackfoot reservation of 17,000,000 acres in Montana, and receive from government annually \$35,000 in such goods as the president may from time to time determine are necessary, pursuant to the treaty of July 13, 1868.

GROTE, George, an English historian, born at Clay Hill, Beckenham, Kent, Nov. 17, 1794, died in London, June 18, 1871. He was educated at Charterhouse school, and in 1809 became a clerk in his father's bank. His leisure hours were given to literature and political studies. He was a liberal in politics, inclining to radicalism, and his first literary production was a reply to an article by Sir James Mackintosh in the "Edinburgh Review" on parliamentary reform. It was published anonymously in pamphlet form in 1821, and he wrote also a small work on "The Essentials of Parliamentary Reform." He studied political economy in the school of Mr. James Mill, and was influenced in philosophy by the theories of Comte. He began to collect materials for his history of Greece in 1823, but was drawn away from this project by the reform movement, and was elected to parliament in 1832 from the city of London. The principal feature of his political career was an attempt to introduce the ballot into English elections. His motion was defeated in 1833 by a vote of 211 to 106. He renewed the motion unsuccessfully the next session, and continued to advocate the measure until the close of his parliamentary service in 1841, when he resigned in order to give his whole attention to his history. While in retirement he contributed to the "Westminster Review" an article on Mitford's "History of Greece," and one to the "London and Westminster Review" on Niebuhr's "Heroic Legends of Greece." The first two volumes of his work were printed in 1846, and were received with general applause from all parties. The 12th volume was published in 1856, bringing down the subject to the end of

the generation contemporary with Alexander, the limit which the author had assigned for it. The work at once rose to a high position in literature, and several editions have been called for. It has been translated into German and French. Mr. Grote throws upon Greek history new light, and unfolds with clearness the progress of Hellenic thought. His geographical descriptions are also exact. He describes battles with minute accuracy, and is equally successful in painting Socrates disputing in the Agora, in defending the sophists, or in unfolding the bold and generous nature of Demosthenes. His philosophical speculations are sometimes abstruse and above the popular understanding; but his style is strong and bold. In 1865 he published "Plato and the other Companions of Socrates." This was to be followed by "Aristotle," which he never completed. In 1868 he succeeded Lord Brougham as president of the council of the university of London. His minor works, "with critical remarks on his intellectual character, writings, and speeches," by Alexander Bain, were published in 1873; and in the same year a sketch of his personal life was published by his widow, the authoress of a "Memoir of Ary Scheffer" (1860), and of "Collected Papers in Prose and Verse" (1862).

GROTEFEND, Georg Friedrich, a German philologist and archæologist, born in Münden, June 9, 1775, died in Hanover, Dec. 15, 1853. He studied in Göttingen, officiated for some time as rector of the gymnasium of Frankfurt, founded in 1817 the *Gelehrtenverein für deutsche Sprache*, and was director of the lyceum of Hanover from 1821 to 1849. He was a contributor to Ersch and Gruber's cyclopædia, wrote on German philology and poetry, and extensively on the ancient languages and the geography of Italy, prepared several Latin grammars for the use of schools, and was the first to question the genuineness of Wagenfeld's alleged discovery of Sanchoniathon's original history of the Phœnicians. He gained reputation by deciphering the Pehlevic inscriptions of the Sassanides at Naksh-i-Rustam, near ancient Persepolis. His principal works on the subject are: *Beiträge zur Erläuterung der persopolitanischen Keilschrift* (Hanover, 1837); *Neue Beiträge zur Erläuterung der babylonischen Keilschrift* (1840); and *Anlage und Zerstörung der Gebäude zu Nimrud* (Göttingen, 1851).

GROTIUS (DE GROOT), Hugo, a Dutch jurist, born in Delft, April 10, 1583, died in Rostock, Aug. 28, 1645. In his 15th year he published an edition of Marcianns Capella, from the annotations of which it is evident the young editor must have been critically acquainted with the works of Cicero, Aristotle, Pliny, Euclid, Strabo, Ptolemy, and many other even more recondite authors. After three years at the university of Leyden, which he had entered at the age of 12, he was made an attaché of Barneveldt's embassy from the Dutch states to Henry IV. He returned to Holland in 1599, published

an edition of the *Phænomena* of Aratus, and began the practice of law at the Hague. In 1607 he accepted the office of advocate general for the treasury of Holland and Zealand, and shortly afterward married the daughter of an opulent family in the latter province. In 1608 he published his treatise on the freedom of the seas (*Mare Liberum*), and in 1610 a dissertation on the "Antiquity of the Batavian Republic." In 1613 he was elected pensionary of Rotterdam for life, and soon afterward was sent to England to adjust a dispute on the subject of fishery in the northern seas. The mission was not successful, and the negotiation was transferred to commissioners at Rotterdam. Grotius had adopted the principles of Arminius, and soon after his return from England became deeply involved in religious disputes. The public peace was violently interrupted through their acrimony; and various events of a short civil war led at length to the arrest of Barneveldt, Grotius, and Hoogarbets. They were tried and condemned, the first to death, and the two others to perpetual imprisonment. Their crime was defence and support of religious toleration. The castle of Loevenstein, on an island formed by the Waal and the Meuse, was selected as the prison of Grotius. His father was denied the privilege of seeing him, but his wife at length obtained permission to share his fate; and with her society and in close habits of study he found his prison by no means an intolerable home. His favorite study was theology; and its result was his celebrated annotations on the Gospels. He also wrote in Dutch the foundation of his treatise on the truth of the Christian religion, which, published afterward in Paris in Latin, became the most valued of all his works, and before the close of the 17th century had been translated into English, French, Flemish, German, Persian, Arabic, and Greek. After nearly two years' imprisonment, the escape of Grotius was effected through the wit and address of his wife. It had been her practice to send away and receive books in a chest; and observing that after a time the guards neglected to examine it in its passage to and fro, she caused Grotius to be carried out in it, March 21, 1621. Disguised as a mason, he escaped to Antwerp. His wife at first was rigorously confined, but was soon liberated. The illustrious refugee was well received at the French court, and in the course of the year became a French pensioner. He immediately published his "Apology," in vindication of his conduct, and attacking the legality of his sentence. The states general in reply outlawed the author, and forbade the reading of his memorial on pain of death. His personal safety was assured meanwhile by letters of naturalization from Louis XIII. He retired to a country seat near Senlis, and began his great work on the "Rights of Peace and War" (*De Jure Belli et Pacis*), for which he made extensive researches, and which has been translated into nearly all European languages. The author

remained more than nine years in France; and at last, through the application of friends and the entreaties of his wife, Prince Frederick Henry, who succeeded the incensed Maurice in the stadtholdership, reversed the decree of confiscation of the exile's property. In 1631 Grotius revisited Holland, but finding no security against renewed persecution, he went to Hamburg in 1632, and received immediate and pressing invitations from Spain, Portugal, Denmark, and Sweden. Gustavus Adolphus had previously made overtures to him, and after the death of that monarch Oxenstiern, the regent, prevailed upon Grotius to become Swedish ambassador at the court of France (1635). He filled this post for 10 years to the entire satisfaction of the government which he represented. The service was far from agreeable to him, but at Oxenstiern's desire Grotius remained at his post until the majority of Christina. On his visit to Stockholm in June, 1645, he was received with great honor and cordiality. He seems to have found Sweden unsuited to his health or disposition, and to have resolved to leave it. Christina at first refused him a passport, but finally dismissed him with large presents of money and plate. The vessel in which he embarked was driven into a port near Dantzic; whence, in the most tempestuous weather, he set forth in an open carriage, but was seized at Rostock by his last illness. Grotius was the first who investigated the principles of international law and attempted to reduce them to a science. Besides the works mentioned, he is the author of a great number of writings on various subjects, among which are: *Adamus Exul*, a tragedy (Leyden, 1601); *Christus Patiens*, a tragedy (1608); *Sophompaneas*, a tragedy (1617); *Defensio Fidei Catholicae de Satisfactione Christi adversus F. Socinum* (1617); "Introduction to the Jurisprudence of Holland" (the Hague, 1631, in Dutch; *Florum Sparsio ad Jus Justinianum* (Paris, 1642); *Via ad Pacem Ecclesiasticam* (Amsterdam, 1642); *De Origine Gentium Americanarum* (Paris and Amsterdam, 1642), and a second dissertation on the same subject (Paris, 1643); *De Imperio Summarum Potestatum circa Sacra* (1647); *Historia Gothorum, Vandalorum et Longobardorum* (Amsterdam, 1655); *Annales et Historia de Rebus Belgicis* (fol., 1657); *Parallelon Rerumpublicarum Libri III.* (3 vols. 8vo, Haarlem, 1801); commentaries on various portions of the Scriptures, Latin poems, and miscellaneous treatises. His letters were published in full at Amsterdam (fol., 1687). His *Opera Theologica* were published in 1679 (4 vols. fol., Amsterdam, and 3 vols. 4to, London), and his poems in 1617 (Leyden; 11th ed., Amsterdam, 1670). There are numerous English translations of the most important of his works, including the treatises *De Veritate Religionis Christianæ* and *De Jure Belli et Pacis*.—See *Étude sur la vie et les travaux de Hugo Grotius*, by Caumont (1862), and Motley's "Life of John of Barneveldt" (1874).—His bro-

ther WILLEM (1597-1662), who was a distinguished lawyer, collected and published his Latin poems, and wrote a treatise on natural law (the Hague, 1655) and lives of the jurists named in the Pandects (Leyden, 1690).

GROTON. I. A town of Middlesex co., Massachusetts, on Nashua and Squannacook rivers, 30 m. N. W. of Boston and 13 m. W. of Lowell; pop. in 1870, 3,584. Since the census the town of Ayer has been taken from it. Four railroads, viz., the Worcester and Nashua, the Fitchburg, the Stonybrook, and the Peterborough and Shirley, intersect at Ayer Junction (formerly Groton Junction). Groton is the seat of the Lawrence academy, which was incorporated in 1793, and owes a liberal endowment to the munificence of the Lawrence family, who are natives of this place. The academy has a library of 2,500 volumes and an endowment of \$80,000. In 1872 the number of instructors was 7, and of pupils 147, of whom 92 were males and 55 females. The town contains several saw and grist mills, manufactories of agricultural implements, paper, and leather, and 10 public schools. II. A town of New London co., Connecticut, on Long Island sound, at the E. side of the mouth of Thames river, and opposite New London; pop. in 1870, 5,124. It is on the Stonington and Providence railroad, the principal village being 12 m. W. of Stonington, and 62 m. by rail S. W. of Providence. There is a good harbor, and the town is interested in the coasting trade, ship building, and the fisheries. A considerable export business is carried on with New York. Mystic and Pequonnock rivers flow through the town to Long Island sound, and supply valuable motive power, which is employed in running cotton mills, &c. There are founderies of brass and iron, manufactories of britannia ware and carriages, two granite quarries, and 11 public schools. The town contains a United States naval station and five post offices, viz.: Groton, Centre Groton, Poquonoc Bridge, Noank, and Mystic River. Groton is the site of Fort Griswold, memorable for the massacre of an American garrison at the time of the destruction of New London and Groton by the British troops under Benedict Arnold, Sept. 6, 1781. The British having captured the fort after a desperate resistance, the American commander, Col. Ledyard, surrendered to the officer of the detachment, and was immediately killed with his own sword, most of his men being also butchered; 85 of the Americans were killed and 60 wounded. A granite monument to commemorate this event was erected in Groton in 1830.

GROTTO (It. *grotta*), a natural cavern, or an artificial excavation in the earth. Among the most famous caverns particularly designated by this name is the Käsegrotte at Bertrich, Rhenish Prussia, so called from the columnar piles of blocks of basalt shaped like cheeses, in the midst of which the cave extends. Still more celebrated is the Grotta del Cane, near Pozzuoli, Naples, referred to by Pliny as one of the

class of excavations known as "Charon's ditches." It would seem from his reference that in his time the mephitic gas for which it is still remarkable was exhaled in quantity sufficient to prove fatal to human life. At the present time this forms but a shallow stratum upon the floor, in which a candle is extinguished and dogs are stifled by way of experiment. The custom of exhibiting the effect of the carbonic acid gas upon dogs has given the distinctive name to the grotto. The excavation is described as extending about 10 ft. into the base of a hill, with a width of 4 and a height of 9 ft. Prof. Silliman, in his "Notes on Europe," speaks of it as a little hole dug artificially into the foot of a hill facing Lake Agnano. The aperture is closed by a door, and the space within is barely sufficient for one person to stand erect. Into this narrow cell a dog is dragged, and placed in a depression of the floor, where he is soon narcotized by the carbonic acid. The earth is warm to the hand, and the volume of gas given out is very constant. Among other celebrated grottoes is that of the island of Antiparos. (See ANTIPAROS.)

GROUCHY, Emmanuel, marquis de, a French general, born in Paris, Oct. 23, 1766, died in St. Étienne, May 29, 1847. He entered the military service at the age of 14, and on the breaking out of the revolution had been for five years a lieutenant in the royal body guards. He was then placed in command of a regiment of chasseurs, served in 1792 under Lafayette, was made a brigadier general, commanded the cavalry in the army of the Alps, and contributed to the conquest of Savoy. The decree of the convention cashiering all officers who belonged to noble families suspended his career for a while. Reëntering the army as a private, he was reinstated in 1795 by a special decree and made a general of division. Being called to the army in Italy in 1798, he persuaded the king of Sardinia to abdicate and surrender Piedmont to France. In 1799, at the battle of Novi, he received 14 wounds and was taken prisoner. The battle of Marengo procured his liberation; he then joined Moreau on the Rhine, took part in the victory of Hohenlinden, and was made inspector general of cavalry. He served in 1806 and 1807 in Prussia; was governor of Madrid in 1808; assisted in 1809 in the battle of Wagram; and finally signalized himself at the battle of Borodino in 1812. On the retreat from Moscow he was placed in command of the guard selected to accompany the emperor. After the battle of Leipsic he vigorously opposed the invasion of France by the allied troops, making a stand at Brienne, La Rothière, Vauchamps, and Étoges. A wound received at Craonne, March 7, 1814, forced him to leave the army. Coldly treated by the Bourbons on the first restoration, he joined Napoleon at once on his return from Elba, and being placed in command of the army at Lyons, arrested the duke of Angou-

lème, and was made a marshal of France. He played a conspicuous part in the concluding scenes of the hundred days; at the head of a corps of the army, he marched into Belgium against the united English and Prussians, fought successfully, June 16, at Fleurus and Ligny, received orders from Napoleon to follow up Blücher and the Prussian army to prevent their joining the English, and, strictly adhering to the very letter of his orders, declined, notwithstanding the entreaties of his subordinate generals, to march toward Waterloo, June 18, and thus became the indirect cause of the defeat of the French army. Being proscribed by a royal decree on the second restoration, he came to the United States, and lived for five years in Philadelphia. An amnesty recalled him to France in 1821; and after the revolution of July, 1830, his rank of marshal was restored. He defended his conduct in several pamphlets, the most important points of which are to be found in his *Fragments historiques* (Paris, 1840).

GROUND HOG. See WOODCHUCK.

GROUND NUT. See PEANUT.

GROUND PINE. See HORSETAIL.

GROUNDSEL, the common name of *senecio vulgaris*, of the natural order *compositae*. It is a little, weedy plant, found in waste places and in gardens from New England to Pennsylvania, adventitiously introduced from abroad. The name groundsel is derived from the Anglo-Saxon word for "ground glutton," probably in allusion to its character as a weed. It is an inconspicuous annual, and not difficult to keep in subjection. Its seeds are a favorite food of many small birds, and the flower heads are sometimes gathered for the purpose of feeding canary birds. Groundsel has no ray flowers, but in our native *senecios* the heads are mostly radiate and showy. Among the commonest of these is the golden ragroot (*S. aureus*), an elegant ornament of our wet meadows; and in the greenhouse the rich purple blossoms of *S. elegans* are much admired. The fireweed, so conspicuous upon recently burnt lands for its coarse rank growth and white silky heads, was formerly called a *senecio*, but is now put in a separate genus, and is *erecthites hieracifolia* (Raf.). *Senecios* are found in every part of the globe, especially in South Africa. Humboldt noticed some species in the upper regions of the Andes, just below the snow line. De Candolle describes nearly 600 species, of which 50 or more are natives of North America.

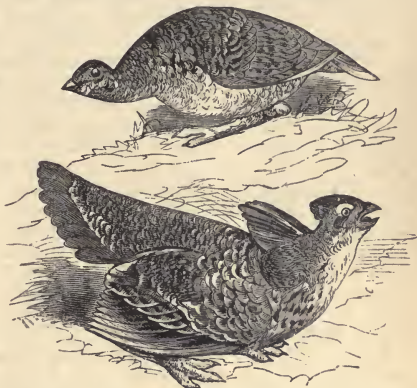
GROUND SQUIRREL. See CHIPMUNK.

GROUSE, the name of gallinaceous birds of the family *tetraonidae*, characterized by a short broad bill with culmen curved; the nostrils concealed by closely set feathers in the nasal groove; wings short, concave, and rounded; tarsi moderate and densely feathered; the toes usually naked, with scaly pectinations along the edges, but feathered to the claws in the snow grouse or ptarmigans. The tail varies in length and shape, and consists of 16, 18, or 20 feathers: there is generally a bare space about

the orbits, with fringed processes above the upper lid; the hind toe is short, and slightly elevated. The old genus *tetrao* (Linn.) has been subdivided into many genera by modern systematists; it included both the grouse and the ptarmigans or moor fowl, the latter of which will be described under PTARMIGAN. The grouse are the largest of the family, robust and round-bodied, frequenting heathy woods, feeding on young shoots, tender buds, and berries, in pine and spruce forests and cedar swamps in the northern regions of America, Europe, and Asia.—In the genus *tetrao* (Linn.) and the allied *centrocercus* (Swains.), the legs are feathered as far as the basal membrane of the toes; the tail is lengthened, slightly narrowed to the somewhat rounded tip, and the shafts stiffened; no ruff on the sides of the neck. The largest species is the wood grouse or capercaillie (*T. urogallus*, Linn.), measuring nearly 3 ft. in length, and weighing about 15 lbs.; the feathers of the head and cheeks are elongated and erectile; the hind neck, back, and sides are minutely varied with black, brown, and gray; the lower breast and belly black, with a few white feathers; the fore part of breast rich glossy green, with metallic reflections. The females are much smaller, and, like the young males, are brown with black crescent marks. In size, strong hooked bill, and noble bearing, it resembles a bird of prey; it is nearly extinct in Great Britain, though it is found in Norway, Sweden, Russia, and northern Asia. It inhabits forests of pine and birch with an undergrowth of juniper; it is extremely shy, but will breed in confinement, and may be domesticated, in which state it feeds on grains and resinous twigs. This species perches in trees; the nest is placed amid brakes and underbrush; the eggs are 8 to 16, yellowish white, with darker yellow spots. The *T. hybridus* (Linn.) is generally considered a hybrid between the capercaillie and the black grouse (*T. tetrix*, Linn.); it is found in northern Europe, and is from 2½ to 2½ ft. long; the general color is black, with purple and bronzed reflections, dashes of white on the belly, and on the secondaries a spot of the same; the scapulars and wing coverts deep brown, with delicate yellowish waves; tail slightly forked, the upper coverts black, the under tipped with white. The black grouse has been described under BLACKCOCK. Among the American species is the Canada grouse, sometimes called erroneously the spruce partridge (*T. canadensis*, Linn.). It is about 16½ in. long; the prevailing color is black in the male, each feather of the upper parts waved with leaden gray; those of the sides, scapulars, and outer surface of the wings have a central white streak expanding toward the tip; the under parts are mostly uniform black, broadly tipped with white on the sides, this color sometimes forming a pectoral band; bar across base of upper mandible, spot on lower lid, line on cheeks and throat, white; quills dark

brown; tail of 16 feathers, dark brown, tipped with a band of orange chestnut half an inch wide; chin, throat, and bill black; under tail coverts black, barred and tipped with white. The female is smaller, but similar, with broader black bars above, and below barred with orange and white; the continuous black on the head and breast is wanting. They are found in the spruce forests and cedar swamps of the northern states to the arctic seas, and westward nearly to the Rocky mountains; their flesh, like that of the other grouse, is excellent, but in the winter it has the bitter flavor of the spruce on which they feed at that season. They are not very shy; when alarmed they resort to trees; the nest is made upon the ground, and the eggs, comparatively few, are varied with white, yellow, and black.—The pheasant-tailed grouse, sage cock, or cock of the plains (*centrocercus urophasianus*, Swains.), is by far the largest of the American grouse, measuring about 30 in., with an extent of wings of about 40; the tail is very long, wedge-shaped, the feathers all lanceolate, and longer than the wings; the feathers of the lower throat and sides are stiff and spiny. Above, the plumage is varied with black, brown, and brownish yellow, the coverts streaked with the latter; black below, the breast and tips of tail coverts white, the lower part of the former with black streaks; the tail has 20 feathers. It is found in the desert plains of the far west, especially about the branches of the Columbia river; it feeds on the various species of wormwood, which impart a bitter flavor to its flesh; it is not shy, and is a poor flier; the eggs are numerous, 13 to 17, of a wood-brown color, with

is 18 in. and the extent of wings 26. Above, the color is light brownish yellow, varied with black, and with rounded white spots on the wings; below pure white, with dark V-shaped marks on the breast and sides; there are no elongated feathers on the neck, as in the next



Pinnated Grouse (*Tetrao cupido*), Female (upper figure) and Male.

species, the bill is stouter, and the tarsi are more densely feathered. It inhabits the northern prairies and plains from Illinois to Oregon. Its food consists of the buds and sprouts of the beech, willow, aspen, larch, and similar trees, and of berries; the eggs, about 13, are white, with colored spots. The pinnated grouse, prairie hen or chicken (*T. cupido*, Linn.; genus *cupidonia*, Reich.), has a tail of 18 feathers, short, truncate, and much graduated, and a tuft of long, lanceolate feathers on each side of the neck, covering a bare space capable of considerable inflation. The plumage is covered with transverse bands of white on a brown ground, the latter nearly black, and the former with a rufous tinge, above; long feathers of the throat black; different specimens vary much in color. The length is about 17 in., with an extent of wings of 28, and a weight of 3 lbs. This species, once common in the Atlantic states, is now mostly confined to the western plains; the old name in New York was heath hen. The food is acorns, buds, leaves, berries, and grains. They remain all the year in their favorite and barren grounds; in spring the males meet at break of day in what are called "scratching places," where they swell and strut with great pomp, and engage in fierce contests, uttering a peculiar sound rendered more intense by the large inflated sacs on the sides of the neck. Their flesh, as well as that of the preceding species, is excellent.—The ruffed grouse, erroneously called partridge in New England and pheasant in the middle states (*bonasa umbellus*, Steph.), is familiarly known by its ruff of velvety black feathers on the sides of the neck, its broad fan-like tail of 18 feathers, partially crested head,

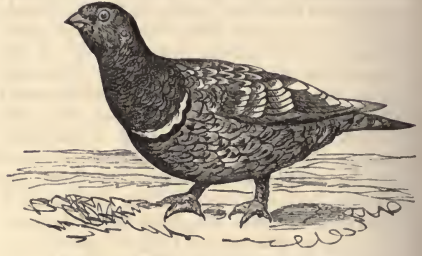


Cock of the Plains (*Centrocercus urophasianus*), Female (upper figure) and Male.

irregular chocolate blotches on the larger end, and about the size of those of a common fowl. The sharp-tailed grouse (*T. phasianellus*, Linn.; genus *pedicatus*, Baird) has a short, graduated tail of 18 feathers, the central pair elongated about an inch beyond the rest; the length

and tarsi naked in their lower half. The sexes are nearly alike. It is reddish brown or chestnut above, varied with lighter heart-shaped spots and streaks of light brownish yellow; below, whitish, with transverse bars of dull brown; tail tipped with gray, with a subterminal bar of black. The length is 18 in., and the extent of wings 2 ft.; it is found in the eastern states and Canadas, and probably as far as the Rocky mountains. The species of the Pacific coast; darker and with a longer middle toe, has been described as the *B. Sabinii*. The ruffed grouse prefers wooded regions, where evergreen trees and streams abound. They are rather solitary, usually seen in pairs or single, and fond of frequenting travelled paths; the males make a peculiar drumming sound, standing upon a log, inflating the body, and beating the air with short and quick strokes of the wings; this is most commonly heard in the morning and evening, but also at all times of the day. The nest is built on the ground, early in May, and the eggs, 9 to 15, are clear brownish white; the female, like other birds of the family, exhibits signs of great distress when her young brood are approached, and makes use of various well known stratagems to lead the intruder from the spot. The flight is vigorous, and accompanied by a loud whirring noise; they are easily hunted with a good dog, generally betaking themselves to a tree; they are taken in traps and snares set in their favorite paths; in severe winters they are often found frozen under the snow, into which they dive for protection, a crust having formed above them. Their flesh is excellent, and in best condition in autumn, when the partridge berries impart a peculiar aromatic flavor; in winter they are sometimes forced to eat the tender buds of the laurel, and then their flesh may possess poisonous properties so strong as to cause death in delicate persons.—The willow or white, the rock, the white-tailed, the American, and the red grouse of Europe, belong to the genus *lagopus* (Briss.), and will be described under PTARMIGAN.—The sand grouse (*pteroles*, Temm.) represents the family of *tetraonidae* in the sandy deserts of Asia and Africa, and in some of the bare rocky plains of southern Russia. Their very long and pointed wings, with the first and second quills the longest, enable them to traverse vast distances with an ease and rapidity unnecessary in birds of the moor and forest; their bodies are light and slender, and the tail large and wedge-shaped; the tarsi robust, long, covered with feathers in front and on the inside; the short and stout toes, united at the base by a prominent membrane, enable them to run lightly over the soft sand. Their prevailing colors are shades of brown, gray, and ochreous yellow, like that of the deserts in which they live. The banded sand grouse (*P. arenarius*, Pall.), found occasionally in Europe, has the belly deep brownish black, with a spot of the same on the throat and a band on the breast; the female is paler,

without the patch on the throat. The food consists of seeds, bulbs, and insects; the nest is made upon the ground, and the eggs are only



Banded Sand Grouse (*Pterocles arenarius*).

four or five in number.—The grouse are polygamous, and very tyrannical in their gallinaceous harem; after the short love season the males desert the females and lead a solitary life, caring for neither mate nor progeny.—The name of partridge cannot properly be given to any grouse; the genus *perdix* (Briss.), and indeed the whole family of *perdicinae*, are not found in America; the term is equally inapplicable to the quail family.

GROUSSET, Paschal, a French communist, born in Corsica about 1845. He is the son of the president of a college, and early went to Paris to study medicine, but became a journalist, and eventually joined Rochefort in the *Marseillaise* and wrote for the *Revanche*, a Corsican journal. Prince Pierre Bonaparte having challenged Rochefort for articles which Grousset had written, the latter sent Victor Noir and Ulrich de Fonvielle as his seconds to the prince, by whom Noir was killed, Jan. 10, 1870. The prince was tried and acquitted, and Grousset was arrested and fined for his violent articles in the *Marseillaise*. He became director of that journal after the proclamation of the republic, Sept. 4, but suspended its publication in consequence of Rochefort's disavowal of its tendency. The fiercest of the various journals which he next edited was *La Bouche de Fer*. He became the foreign minister of the central committee after the insurrection of March 18, 1871, and on being elected to the commune he continued to hold the same position, and in April became member of the new executive commission. He was arrested on June 3, disguised in the attire of his mistress, betrayed by his bearing, which had made him conspicuous as the most fashionable member of the commune. He was transported to New Caledonia in 1872, but escaped in March, 1874.

GROVE, Sir William Robert, an English physicist, born in Swansea, July 14, 1811. He graduated at Oxford in 1833, was called to the bar in 1835, and from 1840 to 1847 was professor of natural philosophy at the London institution. In 1853 he was made queen's counsel, and afterward vice president of the royal society. His scientific researches have been chiefly in

the field of electricity; and his contributions to philosophical publications, principally on this subject, are very numerous. A few only of his original researches can here be noticed. In 1839 he described in the "Philosophical Magazine" his new battery, much more powerful than any previous one, and still in general use under his name, in which platinum is substituted for the copper plate, and nitric for sulphuric acid. About the same time he made the discovery that if two pieces of gold are placed, one in a cell of nitric, and the other in one of hydrochloric acid, and the cells separated by an earthenware partition, no chemical action takes place; but if the two pieces are connected by a metallic wire, they are immediately attacked by the acids. In 1841 he described in the same journal a method of engraving the daguerreotype plate by galvanic action. In January, 1842, Mr. Grove delivered a lecture before the London institution on the progress of physical science, in which he first announced what is now generally known as "the theory of the correlation of forces." In 1847 he published his essay on "The Correlation of Physical Forces," which has passed through several editions, and has been translated into various European languages. Among his numerous discoveries not already mentioned are the decomposition of water into free oxygen and hydrogen, the electricity of the flame of the blowpipe, electrical action produced by proximity without contact of dissimilar metals, molecular movements induced in metals by the electric current, and the conversion of electricity into mechanical force. He was president of the British association in 1866, was appointed a justice of the court of common pleas in 1871, and was knighted in 1872.

GROVETON. See BULL RUN.

GRUBER, Johann Gottfried, a German cyclopedist, professor of philosophy in the university of Halle, born in Naumburg, Prussia, Nov. 29, 1774, died in Halle, Aug. 7, 1851. He wrote nearly 30 works on historical, critical, and imaginative subjects, and was joint editor with Ersch of the *Allgemeine Encyclopädie der Wissenschaften und Künste*. (See ERSCH.)

GRÜN, Anastasius. See AUERSPERG, A. A.

GRÜNBERG, a town of Prussian Silesia, in the government of Liegnitz, 50 m. S. E. of Frankfort-on-the-Oder; pop. in 1871, 11,091. It is walled and surrounded by suburbs. Its environs are noted for their vineyards. It manufactures woollens, linens, printed cottons, silk goods, leather, and champagne wine.

GRUNDTVIG, Nicolai Frederik Severin, a Danish writer, born at Udby, Seeland, Sept. 8, 1783, died in Copenhagen, Sept. 2, 1872. He studied theology at Copenhagen, and in 1810 began to preach in that city. His doctrines offended the clergy, and he finally separated from the orthodox Lutheran church and became the head of a distinct school opposed to centralization in church government. In 1848 he engaged in politics, and became an influential leader in

the diet of the Danish party, in opposition to German influence and in favor of a union of the Scandinavian nations. Grundtvig published two collections of sermons, a collection of hymns, and many historical works, among which are: *Nordens Mythologie* (1808; 2d ed. revised, 1832); *Kort Begreb af Verdenskrøniken* ("Short Sketch of the History of the World," 1812); translations of Saxo Grammaticus and Snorro Sturleson (6 vols., 1818-'22); *Haandbog i Verdenshistorien* ("Manual of Universal History," 4 vols., 1833-'43). Among his poetical works are: *Optrin af Kampelivets Undergang i Nord* (2 vols., 1809); *Roeskilde-Rim* (1814); and *Nordiske Smaadigte* (1838). From 1816 to 1820 he published a literary journal, *Dannevirke*, and from 1848 to 1851 a political weekly, *Danskeren*. During the Schleswig-Holstein war he wrote spirited songs for the Danish cause.

GRUNDY. I. A S. E. county of Tennessee, drained by Collins river; area, 300 sq. m.; pop. in 1870, 3,250, of whom 187 were colored. It has a mountainous surface and a fertile soil. The chief productions in 1870 were 12,131 bushels of wheat, 73,373 of Indian corn, 11,242 of oats, 10,218 of potatoes, and 47 bales of cotton. Capital, Altamont. II. A N. E. county of Illinois, drained by Illinois river; area, 430 sq. m.; pop. in 1870, 14,938. It is intersected by the Chicago, Rock Island, and Pacific, and the Chicago and Alton railroads, and by the Illinois and Michigan canal. The surface is generally level, and the soil is fertile. Timber is not abundant, but bituminous coal has been found. The chief productions in 1870 were 21,850 bushels of wheat, 295,971 of Indian corn, 269,332 of oats, 51,451 of potatoes, 438,309 lbs. of butter, and 37,116 tons of hay. There were 7,264 horses, 6,770 milch cows, 12,575 other cattle, 3,845 sheep, and 8,269 swine; 2 manufactories of agricultural implements, 4 of carriages and wagons, 3 of saddlery and harness, 2 flour mills, 1 tannery, 1 currying establishment, and 1 distillery. Capital, Morris. III. A N. E. central county of Iowa, watered by branches of Red Cedar river; area, about 500 sq. m.; pop. in 1870, 6,399. It consists chiefly of prairies; the soil is fertile. The chief productions in 1870 were 621,322 bushels of wheat, 345,717 of Indian corn, 201,733 of oats, 13,360 of barley, 38,995 of potatoes, 154,107 lbs. of butter, and 14,576 tons of hay. There were 3,667 horses, 2,881 milch cows, 2,995 other cattle, 2,972 sheep, and 4,111 swine. Capital, Grundy Centre. IV. A N. county of Missouri, drained by Weldon and other rivers, and consisting chiefly of fertile prairies; area, 462 sq. m.; pop. in 1870, 10,567, of whom 115 were colored. The chief productions in 1870 were 63,242 bushels of wheat, 13,138 of rye, 427,818 of Indian corn, 186,184 of oats, 37,666 of potatoes, 123,251 lbs. of butter, 48,207 of wool, and 7,100 tons of hay. There were 5,241 horses, 4,137 milch cows, 8,853 other cattle, 18,896 sheep, and 19,110 swine. Capital, Trenton.

GRUNDY, Felix, an American statesman, born in Berkeley co., Va., Sept. 11, 1777, died in Nashville, Tenn., Dec. 19, 1840. He was educated for a physician, but studied law, was admitted to practice in 1798, and soon acquired reputation as an advocate. In 1799 he was a member of the convention to revise the constitution of the state, and was elected to the legislature, and in 1806 was appointed one of the judges of the supreme court of errors and appeals. Soon afterward he was appointed chief justice of Kentucky, which office he resigned in 1808, and removed to Nashville, Tenn., where he soon ranked as the head of the Tennessee bar. He was elected to congress in 1811, and efficiently supported Madison in the war with Great Britain. He was reelected in 1813, but declined to be a candidate in 1815. In 1829, and again in 1833, he was elected a senator of the United States, and was among the most prominent supporters of President Jackson. In 1838 Van Buren appointed him attorney general of the United States. In 1840 he resigned, and was reelected to the senate, but died before taking his seat.

GRUNER, Wilhelm Heinrich Ludwig, a German engraver, born in Dresden, Feb. 24, 1801. He studied in Italy, Spain, France, and England. His first effort, an engraving of a Spanish shepherd, after Velasquez, was followed by a portrait of Mengs, and engravings of Madonnas after Raphael, and of the paintings of Giulio de' Medici and Moses by Murillo. In Rome he published in 1839 a series of engravings, under the title *I mosaici della capella Chigi*, and soon afterward he copied the frescoes in the hall of Heliogorus. For the Berlin museum he prepared, at the request of the king of Prussia, a series of engravings after the cartoons of Raphael at Hampton Court. A disease of the eyes preventing him from working with the burin, he executed many frescoes by order of Prince Albert, and published "Fresco Decorations and Stuccoes," &c. (London, 1844), and "Decorations of the Garden Pavilion in the Grounds of Buckingham Palace" (1846), accompanied with a text by Mrs. Jameson. Resuming his labors as an engraver, in 1848 he published "Ornamental Designs for Decorators and Manufacturers," and in 1850 "Specimens of Ornamental Art." He took a part in the decoration of the London crystal palace and in the illustration of Layard's "Nineveh." His "Raphael Caryatides from the Vatican" appeared in 1852. Between 1854 and 1856 he superintended the decoration of the new wing of Buckingham palace and of Osborn castle. In 1858 he became director of the society of engravers at Dresden, and professor of engraving at the academy in that place. About the same time he published "The Bass Reliefs on the Façade of the Cathedral at Orvieto."

GRÜTLI, or **Rüdl**, a locality of Switzerland, in the canton of Uri, 5 m. S. W. of Schwytz, consisting only of a small space occupied by a meadow with a few cottages and walnut and

chestnut trees, but celebrated as the cradle of Swiss liberty, and as the spot where Stauffacher, Walther Fürst, and Arnold of Melchthal met, according to tradition, during the night of Nov. 7-8, 1307, with 30 followers, and formed a Swiss league against Austrian tyranny. It is at the N. E. declivity of the Seelisberger or Niederbauer Kulm, a mountain about 6,000 ft. high, near the watering place of Seelisberg, on the lake of Lucerne, and is easily accessible by boats from steamers plying between Lucerne and Flüelen. About 1 m. N. of it is the Mythenstein, a lofty rock on which is the inscription *Dem Sänger Tella, Friedrich Schiller, die Urcantone*, 1860. Tell's chapel is 3 m. from Grütli. The land became national property in 1858, having been purchased by the Swiss patriotic association for 55,000 francs.

GRUYÈRE, or **Grayeres** (Ger. *Greyerz*), a village of Switzerland, in the canton and 15 m. S. by W. of the city of Fribourg; pop. about 1,000. It stands on a hill crowned by an ancient and very perfect feudal castle, and gives name to a celebrated kind of cheese. (See CHEESE, vol. iv., p. 352.)

GRYPHIUS, Andreas, a German poet, born at Glogau, Silesia, Oct. 11, 1616, died there, July 16, 1664. He studied at Dantzic and Leyden, travelled in France and Italy, and spent the last part of his life as syndic of Glogau. His tragedies are stilted imitations of the Greek and Latin dramas, but his comedies have much merit, and a new edition of some of them appeared in 1855. He also wrote a Latin religious epic, *Olivetum*. His select poems are contained in W. Müller's collection of German poets of the 17th century (2 vols., Leipsic, 1822).

GUACHARO, a fissirostral bird of the family *caprimulgidae* or goatsuckers, subfamily *steatorninae* or oil birds, and genus *steatornis* (Humboldt). There is only one described spe-



Guacharo Bird (*Steatornis Caripensis*).

cies, the *S. Caripensis* (Humb.); it is nocturnal, living in great numbers in the cave of Guacharo in Venezuela, described by Humboldt. The family and genus are treated in the article GOATSUCKER. The bird is about the size of the common fowl, with a curved and toothed

bill; the color is dark bluish gray, with minute streaks and spots of deep brown, and white spots bordered with black on the head, wings, and tail; the spread of the wings is about 3½ ft. The food is vegetable, principally seeds and hard fruits, upon which they grow so fat that the Indians destroy great numbers for the sake of their oil, which they use in preparing their favorite dishes. They would long ago have been exterminated, were it not for the superstitious fears of the natives, who do not dare to penetrate far into their caves, terrified by the shrill cries of the vast multitudes when disturbed by the torches of explorers.

GUACO, or **Huaco**, a name given in the tropical regions of America to several plants used as antidotes for the bites of poisonous snakes. *Aristolochia guaco* is said to be the one most

in repute; and so great is the confidence in its efficacy that the Indians and negroes of parts of South America will not undertake a journey without carrying some of the dried leaves of the plant. The aristolochias are generally climbing plants, with grotesquely formed and often lurid-colored flowers. Two North American species of *aristolochia* were found by the early settlers to be in use among the aborigines for the same purposes as the South American one, and they still retain the name of Virginia snakeroot. The name guaco is also given to one of the composite family, the *mikania guaco*, described by Humboldt and Bonpland as a plant with twining stems, leaves ovate, pointed, and dentate, and flowers in opposite, axillary corymbs. The fresh leaves are bruised and applied to the wound, and they are also made to yield an infusion which is drunk at the same time. The preparation has a bitter, disagreeable taste, and acts as a mild tonic and a gentle stimulant to the secretions.

GUADALAJARA, a city of Mexico, the second in importance of the republic, capital of the state of Jalisco, 275 m. N. W. of the city of Mexico; pop. about 70,000. It stands on the left bank of the Rio Santiago, in the midst of a vast barren plain. The streets are wide, and the houses, which are generally but two stories high owing to the frequency of earthquakes, are neat and handsome. There are 14 public squares, the finest of which, the Plaza de Armas, is very spacious. On its north side is the cathedral, completed in 1618. The cupolas of both towers were destroyed by the great earthquake of May 31, 1818. The governor's

palace occupies the whole of the east side of the plaza, and the two remaining sides form each an uninterrupted arcade, with brilliant shops and bazaars. Besides the cathedral there are many churches and convents. The Alarcon theatre, of modern construction, is large



Plaza de Armas, Guadalajara.

and elegant. There are two hospitals, a mint, two prisons, a university, a seminary, a school of design, a collegiate and several common schools, and many private schools. There are manufactories of *serapes*, a kind of shawl, paper, earthenware, and leather. The climate is temperate.—The town was founded in 1532 by Cristóbal de Oñate, under the name of Santo Espiritu. It became the capital of New Galicia in 1543, and an episcopal see in 1549.

GUADALAJARA. **I.** A province of Spain, in New Castile, bordering on the provinces of Segovia, Soria, Saragossa, Teruel, Cuenca, and Madrid; area, 4,869 sq. m.; pop. in 1870 (estimated), 208,638. The surface toward the north and east is mountainous, particularly in the district of Atienza, but in the south and west it expands into large elevated plains. The chief rivers are the Tagus, Tajuña, and Jarama. In the district of Tamajon the soil is well adapted to corn; in that of Alcarria the vine and olive also grow; while the mountain districts are suited to pasturage. The most important minerals are iron, lead, and coal. Mines of iron have been worked from the time of the Romans. **II.** A city, capital of the province, on the Henares river, 33 m. N. E. of Madrid; pop. about 8,000. It has a large Roman aqueduct, which supplies the public fountains. There are ten churches, two hospitals, a military school, a palace of the dukes of Infantado, and manufactories of cloth.

GUADALQUIVIR (anc. *Batis*), a river of Spain, which rises near the S. E. corner of the province of Jaen, flows first N. E. and N. W. and then S. W. through Andalusia, passing Andu-

jar, Villafranca, Cordova, and Seville, and falls into the Atlantic at San Lucar de Barrameda, 14 m. N. of Cadiz. It is more than 250 m. long, and is navigable for nearly 70 m. Its principal tributaries are the Guadalimar, Jan-dula, and Guadiato on the right, and the Guadiana Menor, Guadajoz, and Jenil on the left. The Guadalquivir drains an area of about 20,000 sq. m.

GUADALUPE, a river of Texas, rising in Edwards co., in the S. W. part of the state. It flows nearly E. until it enters the alluvial plain that stretches toward the gulf of Mexico, from which point it pursues a general S. course to its junction with the San Antonio, about 12 m. from its mouth in Espiritu Santo bay. Its length is about 250 m. On its banks are the towns of New Braunfels, Seguin, Gonzales, Clinton, and Victoria. The San Marcos, which enters the Guadalupe in Gonzales co. from the north, is the principal tributary. Steamers have occasionally ascended to Victoria.

GUADALUPE, a central county of Texas, drained by the Guadalupe river; area, 807 sq. m.; pop. in 1870, 7,282, of whom 2,534 were colored. It has an undulating surface, covered with prairies and good timber. The chief productions in 1870 were 197,889 bushels of Indian corn, 13,556 of sweet potatoes, and 2,874 bales of cotton. There were 6,859 horses, 6,061 milch cows, 51,454 other cattle, 3,262 sheep, and 11,748 swine. Capital, Seguin.

GUADALUPE, or **Guadalupe Hidalgo**, a small town in the republic and federal district of Mexico, about 8 m. N. of the capital, with which it communicates by two beautiful parallel roads. It owes its importance to its church, situated at the foot of the Cerro de Tepeyac, and dedicated to Nuestra Señora de Guadalupe, the patron saint of the republic, who is there represented by a gorgeous image, and whose reputed power of working miracles attracts immense numbers of pilgrims from all parts of the country. Her feast is celebrated annually with great pomp. After the defeat of Santa Anna's troops by the American forces, the treaty of peace was signed at Guadalupe, Feb. 2, 1848.

GADELOUPE, one of the Leeward islands of the West Indies, and the most important of those which belong to France, between lat. 15° 57' and 16° 30' N., and lon. 61° 15' and 61° 45' W.; area, including dependencies, 625 sq. m.; pop. in 1868, 152,910, three fourths of whom are colored. It consists, properly speaking, of two islands, separated by a narrow channel, not more than from 30 to 100 yards broad, called Rivière Salée or Salt river, navigable for small vessels. The western island, styled Guadeloupe proper, is 35 m. long and 18 m. wide; the eastern, called Grande-Terre, is of about the same length, but only 12 m. wide. Guadeloupe proper is of volcanic origin, and is traversed from N. to S. by a mountain range whose summit is a volcano called the Soufrière, about 5,000 ft. high. Grande-Terre is low,

flat, and marshy, composed of coralline matter and marine detritus. The climate is hot, humid, and unhealthy. Hurricanes are frequent and destructive. In 1843 there was a severe earthquake. The exports are sugar, molasses, rum, cotton, tobacco, coffee, dye woods, and copper. The imports are cotton goods, pottery, glassware, provisions, medicines, &c. In 1870 the exports to France amounted to 24,900,000 francs, the imports from France to 9,800,000 francs. The government of Guadeloupe consists of a governor, a privy council of 6, and a general council of 30 members. It has its seat at Basse-Terre, the capital, and exercises jurisdiction over the islands of Guadeloupe, Marie Galante, Désirade, Les Saintes, and St. Martin. Grande-Terre possesses two harbors, those of Moule and Pointe-à-Pitre. The latter, at the S. entrance of the Rivière Salée, is one of the best in the Antilles, and is the residence of a United States consul. Guadeloupe was discovered by Columbus in 1493. The French took possession of it in 1635, and after having been repeatedly taken from and by them in the next century and a half, it was ultimately restored to them in 1816. Slavery was abolished in 1848.

GUADIANA (anc. *Anas*), a river of Spain, rising on the N. side of the Sierra Alcaraz, in La Mancha, and falling into the Atlantic between the Spanish town of Ayamonte and the Portuguese town of Castro Marim. It flows first N. W., and after several windings enters Estremadura, which it traverses in a westerly direction, passes Badajoz, and forms altogether 60 m. of the boundary between Spain and Portugal. In the Portuguese province of Alemtejo it forms a cataract called the Salto del Lobo (wolf's leap), a narrow passage between the Sierra Abeloeira and the Sierra de Caldeirão. It is navigable above the Chanza. Length about 380 m.

GUADIX, an old city of Spain, in the province and 42 m. E. N. E. of the city of Granada, on the N. declivity of the Sierra Nevada; pop. about 11,000. It was once a place of considerable strength, and is still surrounded with walls, and is said to be the oldest bishopric in Spain. It has manufactories of silk, sail cloth, cutlery, and earthenware.

GUAHAN, **Guam**, or **San Juan**, the largest and southernmost of the Ladrone islands, in lat. 13° N., lon. 145° E.; pop. about 5,000. It is about 100 m. in circumference, and surrounded by coral reefs. The coasts are broken by several bays, one of which, called Calderon de Apra, is a commodious haven. The S. part of the island is of volcanic formation, and there is also a small volcano in the N., but the shores on this side are high and coralline. The interior is well watered, wooded, and fertile, rice, maize, cacao, sugar cane, indigo, cotton, and fruits growing in profusion. The domestic animals of Europe were imported long ago, but most of them have become wild. The primitive possessors of the island were long

since extirpated. The present inhabitants, descendants of Mexicans and Philippine islanders, are peaceable, and are skilful mechanics. The principal place is San Ignazio de Agana, a fortified village of bamboo huts, having a good harbor enclosed by coral reefs. The island was discovered by Magalhaens in 1521.

GUAIAECUM, a name applied to both the wood and a resinous substance from the *guaiacum officinale*, of the natural order *zygophyllaceæ*. The tree grows in the West Indies and on the mainland opposite. The trunk is sometimes 5 ft. in circumference. The wood, commonly known as *lignum vitae*, is remarkably heavy and hard, and is much used for the sheaves of tackle blocks, for nine-pin balls, and other purposes requiring strength and resistance to wear. It possesses medicinal properties, as does also the concrete juice or resin. Both are kept by druggists, the wood in the form of chips or shavings, and the resin in lumps or powder under the name of gum guaiacum.



Guaiacum officinale.

The wood contains about 26 per cent. of resin, and 0.8 of a bitter pungent extractive. The resin, which is the more active medicine, is obtained either by spontaneous exudations from incisions made into the tree, or by heating blocks of the wood, in which auger holes have been bored in the centre in the direction of the grain, and collecting the juice as it flows out through the holes; also by boiling the chips and sawdust of the wood in salt water, and skimming off the matter which rises to the surface. This is the form in which it is usually met with. More rarely it is found in rounded or oval masses, about the size of a walnut, called "guaiac in tears;" this is said to be produced by *G. sanctum*, another West Indian species, which is also found in southern Florida. The irregular-shaped pieces brought to the United States are of a dark olive color without and reddish brown within, diversified with various shades; they have a slight fragrant odor, and a pungent acrid taste after being held in the mouth a short time. The

pure substance is entirely soluble in alcohol, ether, alkaline solutions, and sulphuric acid. It is adulterated with common rosin, from which it may be distinguished by the solubility of the latter in turpentine. The powder and the tincture become green on exposure to light. The tincture affords blue, green, and brown precipitates with the mineral acids, and a blue color with oxidizing agents. If tincture of guaiacum is applied to the freshly cut surfaces of many vegetables, or added to infusions of the green plants, it gives a bright blue color, which is due to the presence of oxygen in the nascent form or of ozone, for the presence of which guaiacum is a useful test. The color is most marked at those portions of the plant where growth is taking place most rapidly. Similar reactions afforded by guaiacum with blood, pus and mucus, have been made available for physiological and medico-legal purposes. Guaiacum is administered in many complaints, especially chronic rheumatism. It promotes various secretions, especially those of the skin and kidneys, but diminishes excessive secretion of mucous surfaces. In large doses it purges. Febrile affections and irritated conditions of the gastro-intestinal membrane contraindicate its use. When a rheumatic diathesis underlies bronchitis, leucorrhœa, dysmenorrhœa, amenorrhœa, or syphilis, guaiacum often yields an unequivocal benefit. It is much less used now than formerly. It may be given in the form of decoction of the wood, tincture of the resin, or of the resin in substance. The dose of the latter is from 10 to 30 grs.; of the tincture, about a teaspoonful.

GUAICURÚ, a nation of Brazilian Indians, in that portion of the region watered by the Paraguay between lat. 18° and 22° S. They are of medium height and strong, and their skin is of copper color. Their hair is long and straight. Formerly they tattooed their bodies. The only garment of the men was a sort of short drawers; on feast days they ornamented their heads with crowns of feathers, while in the under lips they inserted a cylindrical piece of wood about three inches long. The women are ill shaped and always painted. They accompany the men in all their excursions on horseback and in canoes, and the men aid them in cooking. Their chief occupations are spinning cotton, weaving, making utensils of earthenware, and manufacturing cords and mats. The riches of the Guaicurús consist in the number of their horses, which they mark just as they mark their women. They live mostly on venison, fish, and fruit, and hate agriculture. Their language is harmonious, though somewhat guttural. They count the years by the return of the fruit season. A few of these Indians were converted by the early missionaries, but the mass are still pagans. The population is distinguished into the classes of the nobles, warriors, and slaves.

GUALEYGUAY. 1. A river of the Argentine Republic, which rises in the mountains in the

centre of the province of Entre-Rios, flows S. and S. W., unites with the Pabon, and falls into the Paraná, after a course of about 150 m. It is navigable by schooners to the town of Gualeyguay, 40 m. from its mouth. II. A town on the left bank of the river, 120 m. N. by W. of Buenos Ayres; pop. about 8,000. It is in the midst of an extensive sheep and cattle district, is growing rapidly, and has an active trade in hides, wool, timber, and firewood.

GUALEYGUAYCHÚ, a city of the Argentine Republic, on the right bank of the Gualeyguaychú river, in the province of Entre-Rios, 120 m. N. of Buenos Ayres; pop. about 25,000 (in 1849, 7,000). The streets are wide, regular, and kept in good order, and the town is well built. In the surrounding country immense numbers of cattle and sheep are reared; there are many salting establishments in the vicinity, and there is a large trade in jerked beef, hides, wool, tallow, bone manure, and other animal products. Gualeyguaychú is the entrepot for all the export trade from the eastern portion of the province.

GUAM. See **GUAHAN**.

GUAMANGA. See **ΔΥΑΔΥΟΗ**.

GUAN, a gallinaceous bird, of the family *cracidae* or curassows, and subfamily *penelopinae*; it includes the genera *ortallida*, *penelope*, and *oreophasis*, the first two South American, and the last peculiar to Central America. (For the family characters, see **CURASSOW**.) In the genus *penelope* (Merrem) the bill is shorter than the head, broad at the base, arched at the tip; wings short and rounded, with the fourth to the sixth quills the longest, and the first series arched and narrowed at the ends; tail long, very broad, and rounded at the end; tarsi rather

from 2 to 2½ ft. in length; the color is a shining reddish green, with rump and belly chestnut, neck and chest white spotted; naked temples violet, and the throat and feet red; the female is of a more reddish tint, with the crest, neck, and mantle bordered with white. Several other species are described, all inhabiting the central portion of South America. Though the guans have most of the habits of the curassows, they are far less gregarious; they are more noisy and restless, and have two broods in a year, about January and June; the nests are built in trees. They are mild and peaceable, easily domesticated, breeding in captivity. They are heavy fliers, but rapid runners, keeping their wings unfolded.—The paragua guans (*ortallida*, Merrem) have the head and throat covered with feathers, or with very slight bare spaces on the cheeks and throat; the bill is higher and more pheasant-like than in the *penelope*. The best known species (*O. katraea*, Bodd.) is about 20 in. long, bronze-colored above, whitish beneath, and reddish on the head; they prefer woods near the seacoast, and are fond of cultivated fields; the voice is loud and disagreeable, resembling the utterance of their specific name; they are found only in the warm regions of South America.—A curious and handsome bird of this family is the *oreophasis Derbyanus* (Gray), from Guatemala. The base of the bill is covered with velvety black down; the space above the eye is naked, and the forehead is surmounted by a broad, rounded, truncated red knob; there is a small bare space on the throat. The general color above is greenish black; below whitish, with longitudinal blackish dashes; white band on the middle of the long and rounded tail; bill, legs, and bare spaces red.

GUANABACOA, a town of Cuba, on a bay of the same name, 2 m. E. by S. of Havana; pop. about 7,000. The streets are wide and regular, and the houses remarkably well built, many of them being very handsome. It has a church, two convents, a theatre, philharmonic society, schools and academies for both sexes, and several hospitals. It is rendered especially attractive by its sea baths, which are frequented by the wealthy Havanese. Many Havana merchants reside here. It communicates with Havana by rail.

GUANACACHE, a lake of the Argentine Republic, in the province of San Juan, lat. 31° 50' S., lon. 68° 40' W. Its length is about 40 m., and mean breadth 14 m.; it is fed by the Mendoza, San Juan, and other rivers, and sends its waters through the Cruces and Lake Silverio to the large lake El Bebedero on the confines of the provinces of San Luis and Mendoza.

GUANACASTE, a province of Central America, lying between Lake Nicaragua and the bay of Nicoya, and comprising a broken country, thinly populated, and only adapted for grazing. During the dominance of the Spanish crown it was under the political and ecclesiastical juris-



Crested Guan (*Penelope cristata*).

slender, as long as the middle toe; hind toe long and on the same plane with the others; claws short and curved; the sides of the head and front of the throat naked and wattled, the latter capable of inflation. The crested guan (*P. cristata*, Linn.) is the largest, measuring

diction of Nicaragua; but after the independence, and the establishment of the republic of Central America, it was set off by the federal congress to the state of Costa Rica. The measure was declared to be temporary, and was against the wishes of its inhabitants. On the dissolution of the federation, Costa Rica asserted jurisdiction over it, on the strength of the enactment of congress; the question led to bitter discussions, until by a treaty in 1858 the greater part of the district was conceded to Costa Rica. Nicaragua still urges her claim to the province. In 1873 telegraphic communication was established between Libertad, the capital, and San José, the capital of Costa Rica.

GUANACO. See LLAMA.

GUANAJUATO. I. A central state of Mexico, lying between lat. 20° and 22° N., and lon. 100° and 102° W., and bounded N. by San Luis Potosí, E. by Querétaro, S. by Michoacan, and W. by Jalisco; area, 11,130 sq. m.; pop. in 1869, 874,073, about 200,000 of whom are whites of Spanish descent, 300,000 pure-blooded Indians, many of whom speak only their own languages, and the remainder mestizos. The state is divided into five departments: Guanajuato, Leon, Celaya, Allende, and Sierra Gorda. The principal towns are Guanajuato, Celaya, San Miguel de Allende, Salvatierra, Salamanca, and Silao. The surface of the country, almost the whole of which is comprised within the plateau of Anahuac, at a mean height of 6,000 ft. above the sea, is extremely irregular. It is traversed

by two mountain chains from S. E. to N. W.; that to the north is the Sierra Gorda, the other the Sierra de Guanajuato. In the latter are the three peaks of Los Llanitos, upward of 9,000 ft. high, El Gigante, and El Cubilete. There are other cordilleras to the south, between which and the Sierra de Guanajuato lie picturesque and fertile valleys, watered by numerous torrents, and comprehended under the general designation of El Bajío. The three principal rivers are the Rio de Lerma and its tributaries, the Laja and the Turbio. The only lake of note is the Yuriria, not far from the capital, 12 m. long and $4\frac{1}{2}$ broad; its waters, which are perfectly fresh, abound in *bagres*, a small fish much esteemed. Most of the mountains are porphyritic, but the Cerro del Cubilete is mostly basaltic. The mines of Guanajuato are by far the richest in the republic. The most extensive silver mine was that of Valenciana, which for

40 years yielded an annual profit of \$3,000,000; in 1803 its depth was 1,800 ft.; it was worked by 3,100 Indians and mestizos. Lead, tin, copper, iron, cobalt, sulphur, salts, crystals, marble, &c., are found in many parts of the state. There are numerous hot and sulphur springs, well known and much frequented by invalids. The climate in the department of Guanajuato is generally mild and salubrious, while in the district of La Luz and in the elevated regions of the Sierra de Guanajuato it is quite cold. Some years little or no rain falls, and the crops fail. The soil of Guanajuato is one of the most fertile in Mexico, and large crops of wheat, barley, maize, potatoes, and several varieties of beans are obtained. Chilli, the fruit of the *capsicum annuum*, is one of the staple products; the maguey (*agave Americana*) is plentiful; the sugar cane grows well in some parts; the olive flourishes, as do most of the European fruits and leguminous plants; and the forests produce an abundance of building



Cathedral of Guanajuato.

timber. The chief industry is mining; but agriculture is the favorite occupation of the Indians. There are cotton-spinning factories in Salamanca, which is also celebrated for its excellent earthenware; cotton fabrics are made in Salvatierra; woollen stuffs in Celaya; and tanneries exist in all the large towns. The staple articles of export are the precious metals, spices, medicinal plants, and hides. II. A city, capital of the state, situated in a deep valley 6,836 ft. above the sea, 160 m. N. W. of Mexico; lat. 21° 1' N., lon. 101° W.; pop. about 63,000. Such is the unevenness of the site that in many streets the houses appear to be built in amphitheatre, and often the door of one dwelling is almost on a level with the roof of the next. Most of the streets are too narrow for wheeled vehicles, and all are extremely irregular. On the east rises a mountain torrent which passes through some of

the streets, and causes much damage during floods. Guanajuato has many handsome buildings, private and public; among the latter are the *alhóndiga de granaditas* (now used as a public granary, but memorable as the scene of important events during the war of independence), the parish and several other churches, monasteries and convents, and the mint. There are also a college, several public and a few private schools, a theatre, a hospital, and a charitable institution.—Guanajuato was founded in 1554, and was made a city in 1741.

GUANARE, a city of Venezuela, in the state of Barinas, 215 m. S. W. of Carácas; pop. about 12,000. It is situated in a picturesque valley, has straight wide streets, well built houses, and a few substantial public buildings, one of which is its church, much resorted to by pilgrims. There is a college, and dependent upon it a few schools. Cattle are the chief source of wealth. The principal articles of export are cacao, coffee, indigo, sugar, and tobacco. Guanare was founded in 1593 by Juan Fernandez de Leon, or according to some in 1609. A river of the same name (sometimes called the Guanarito), a tributary of the Orinoco, passing within 3 m. of the city, considerably facilitates exportation.

GUANCHES, the aborigines of the Canary islands, extinct since the end of the 16th century. They are said to have been gigantic in stature, well proportioned, of an olive complexion, with long straight hair, and simple and mild in character. They believed in an invisible creator of the universe, an evil spirit, a future state, and a place of torment for the bad, which they supposed was in the volcano of Teneriffe. They preserved the bodies of their dead and deposited them in catacombs, which are now visited among the curiosities of the islands. They had solemn marriage rites, in preparation for which the brides were fattened on milk. Not more than 150 words of their language are known, and these have an analogy with certain Berber dialects. Their origin is disputed. Some regard them as Libyans who fled to these islands on the conquest of Barbary by the Arabs, and this opinion is supported by the similarity of several customs of the Libyans and Guanches. Humboldt supposes them to have belonged to the races of the old continent, perhaps to the Caucasian, and not, like the rest of the Atlantes, to the nations of the western world.

GUANCABELICA. See HUANCABELICA.

GUANO, a town of Ecuador, in the province of Chimborazo, about 100 m. S. W. of Quito; pop. about 9,000. It contains many fine houses, a handsome church, and manufactories of woollen stuffs, carpets, blankets, sulphuric acid, &c. Cinchona bark is exported.

GUANO (Sp. *guano* or *huanu*, Peruvian *huanu*, dung), the excrement of sea fowl, intermixed with their decomposed bodies and eggs, and the remains of seals, found accumulated principally upon the islands of the Pacific and coasts of South America and Africa. The three small

islands called the Chincha islands, off the south coast of Peru, and the Lobos islands off the north coast, were covered with it. It was known to the ancient Peruvians as a valuable manure, and the immense deposits of it were an especial object of care to the incas. Acosta (quoted by Prescott) states that during the breeding season no one was allowed under pain of death to set foot on the islands on which it was produced, and to kill the birds at any time was a like offence. The Spanish conquerors called the islands the Sierra Nevada, or snowy mountains, from the hills covered with white saline incrustation. Humboldt first drew attention in Europe to the substance in 1804. He described the deposits as covering the granitic rocks of the Chincha islands to the depth of 50 or 60 ft., and yet the accumulation of the preceding 300 years had formed only a few lines of this thickness. He procured analyses to be made of the substance by Fourcroy, Vauquelin, and Klaproth, by which it was found to be composed of phosphate of ammonia and lime, with urate and oxalate of ammonia, water, organic matters not determined, and some sand. Sir Humphry Davy alluded to it about 1810 as likely to prove valuable to European farmers; and in that year a trial was made of it at St. Helena by Gen. Beaton. But none was brought to Europe for trial till 1840, when 20 casks were imported into Liverpool by Mr. Myers. The next year the shipments amounted to several cargoes. The exclusive right of digging and shipping guano for the term of nine years was sold at this time by the Peruvian and Bolivian governments for the sum of \$40,000; but the contract was soon after repudiated by the former, as the increasing demand for the article developed the immense value of the deposits. The monopoly was soon after revived, however, the Peruvian government confining the exportation and sale to a single house in London and another in New York. Upon the Chincha islands it was estimated that there were about 40,000,000 tons, the largest one having no less than 17,000,000 tons. The Lobos islands also contained enormous deposits, and many smaller islands were covered with it. Upon the principal Chincha island the deposit is said to attain a thickness of 160 ft. The exports from these localities rapidly increased, so that guano became an important article of commerce, and vessels returning from the Pacific to England or the United States now found a profitable return cargo at the Chincha islands, instead of going as they had previously done to China and the East Indies in search of one. The revenue to the Peruvian government from this trade exceeded that from all other sources; and its agents reaped enormous profits from their authorized commissions upon the shipments. The demand led to explorations in other parts of the world, and other deposits were found, but nearly all inferior in quality to those collected upon the rainless islands off the coast of Peru. Upon

these the ingredients have remained little changed in the dry atmosphere and under the tropical sun. The uric acid and ammonia, both products particularly subject to ferment and decompose in the presence of moisture, remain unaltered, except as they become dry and are locked up in the coarse brown powder produced from these and the other ingredients of the excrement. So the nitrate of soda and common salt, both deliquescent in a moist atmosphere, are found as a dry deposit among the parched sands of the desert of Atacama in the same rainless district. In localities subject to rains these valuable nitrogenous compounds disappear, and the value of the guano consists principally in the next useful ingredients, the phosphates, which remain. The greater portion of the guano product of Peru is sent to England. The entire imports into Great Britain amounted in 1870 to 280,311 tons, valued at £3,476,680; in 1871, 178,808 tons, valued at £1,986,989; and in 1872, 118,704 tons, valued at £1,201,042. Of the imports in 1872, 74,401 tons, valued at £875,882, came from Peru; 17,475 tons, worth £113,073, from the islands in the Pacific; and 14,068 tons, worth £108,150, from Bolivia. During the year ending June 30, 1872, there was imported into the United States 14,309 tons of guano, valued at \$423,323, of which 11,654 tons, worth \$385,063, were from Peru, and 1,820 tons, worth \$24,473, from the British West Indies. Besides this amount, 4,209 tons, valued at \$60,865, were from the islands, rocks, and keys belonging to the United States.—The composition of guano is exceedingly complex. The following minute analyses of South American samples

were communicated by J. Denham Smith to the chemical society, and published in vol. ii. of their "Memoirs," Nos. 1 and 2 were in the state of powder; the others were of the concrete variety:

CONSTITUENTS.	1.	2.	3.	4.	5.
Soluble in cold water.					
Water.....	222.00	215.00	204.20	106.66	77.00
Muriate of ammonia.....	25.50	85.22	.....	4.43	80.80
Sulphate of potash.....	80.00	.....	.....	.....	.....
Sulphate of soda.....	trace	87.90	259.44	12.23	191.77
Oxalate of ammonia.....	74.00	100.83	98.90	.....	.....
Oxalate of soda.....	.....	.....	.....	.....	105.68
Phos. of ammonia.....	63.30	30.06	61.24	trace	.....
Phosphate of lime.....	.....	12.56	.....	.....	.....
Phosphate of potash.....	.....	20.02	77.82	14.94	49.47
Phosphate of soda.....	.....	85.82	.....	.....	3.60
Chlor. of potassium.....	.....	.....	.....	.....	41.63
Chloride of sodium.....	.....	.....	29.22	9.50	286.81
Organic matter.....	15.00	61.74	6.65	2.40	25.38
Soluble in boiling water.					
Urate of ammonia.....	154.18	25.12	.....	.....	.....
Uric acid.....	25.16	.....	.....	.....	.....
Phos. am. and mag.....	5.64	4.04	7.84	.....	1.38
Phosphate of soda.....	1.20	1.28	.....	trace	.....
Phosphate of lime.....	1.26	2.88	.....	11.37	1.10
Organic matter.....	11.18	6.88	8.60	10.00	7.56
Insoluble in water.					
Oxalate of lime.....	25.60	107.26	109.58	.....	.....
Phosphate of lime.....	197.50	192.00	62.70	664.47	131.13
Phos. of magnesia.....	20.20	19.84	8.74	30.56	25.80
Humus.....	25.86	20.60	8.62	.....	.....
Organic matter.....	.....	11.40	.....	20.73	13.86
Water.....	84.56	42.42	49.74	50.60	.....
Sand, &c.....	15.60	16.43	7.20	20.43	4.20
Ox. iron and alumina.....	.....	.....	.....	.....	1.50
Loss, &c.....	0.44	1.50	4.98	2.68	.....
Total.....	1,000.00	1,000.00	1,000.00	1,000.00	1,002.22

The following are forms and examples of ordinary commercial analyses:

CONSTITUENTS.	Angamos.	Peruvian.	Ichaaboe.	BOLIVIAN.		Latham island.	Saldanha bay.	Australian.	Patagonian.	Chilian.
				Government.	Inferior.					
Water.....	12.36	13.73	15.59	16.44	14.15	24.96	21.08	13.20	20.61	14.89
Org. matter and ammon' al salts.	59.92	58.16	32.49	12.23	26.14	10.96	14.93	13.77	19.72	16.81
Phosphates.....	17.01	23.48	19.63	56.09	23.18	54.47	56.40	44.47	30.66	36.90
Sulphate of lime.....	.....	.....	.....	.....	9.65	2.32	.....	4.55	1.30	.....
Carbonate of lime.....	.....	.....	.....	.....	12.57	2.20	.....	8.82	3.06	10.23
Alkaline salts.....	7.20	7.97	8.82	11.33	5.97	4.06	6.10	7.34	7.01	6.54
Sand.....	8.51	1.66	6.72	2.81	8.09	0.51	1.54	7.85	17.04	14.26
Total.....	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Ammonia.....	21.10	17.50	10.42	2.57	8.26	1.26	1.62	1.01	2.69	1.43
Phosphoric acid in alkaline salts.	1.20	2.50	.....	8.11	.....	.....	.....	.....	8.00	.....

For commercial purposes it is of no importance to enumerate all the compounds. The approximate value of samples can be arrived at in the following manner: Multiply the values named below by the per cent. found of each ingredient; the sum obtained will represent the value of 100 tons of the guano. Thus for the nitrogen found the rate per cent. is \$370, or if, instead of this being separated, the ammonia is estimated, the rate is \$300; for phosphate of lime the additional amount is \$40; soluble phosphate of lime, \$120; organic matter, \$5; alkaline salts, \$5; sulphate of lime, \$5. Example of sample of first-class Peruvian guano:

	Per cent.
Moisture.....	15.10
Organic matter.....	51.27 × \$5 = \$256.35
Silica.....	2.20
Phosphate of lime.....	22.13 × 40 = 885.20
Phosphoric acid.....	3.23
Alkaline salts.....	6.07 × 5 = 30.35
100.00	
Soluble phosphate of lime, equivalent to the phosphoric acid above.....	7.00 × 120 = 840.00
Ammonia derivable from the organic matter above.....	16.42 × 800 = 4,926.00
Value of 100 tons.....	\$6,987.90

The following three analyses of Jarvis island and one of Baker's island guano are by Prof. John C. Draper of New York:

CONSTITUENTS.	Jarvis Island.		CONSTITUENTS.	Jarvis Island.	Baker's Island.
Water	20.00	17.50	Water	7.50	4.50
Org. matter and ammon' l salts	8.00	4.00	Organic matter	4.00	11.00
Phosphates....	21.00	30.00	Soluble salts ..	2.50	7.00
Sulph. of lime.	52.00	44.50	Sulph. of lime.	5.00	
Alkaline salts..	4.00	4.00	Phos. of lime...	81.00	70.80
			Carbs. & silica	....	1.50
Total.....	100.00	100.00		100.00	100.00

Analyses and calculations like those given ought to be made in entering upon all large purchases of guano, as well on account of the great natural differences in the qualities of the various kinds, even from the same locality, as of the gross adulterations which are largely and most ingeniously practised; substances of no value as fertilizers being intermixed with the genuine article, so as to very materially reduce its value. Full half the guano sold in England is said to be thus deteriorated. The analyses, moreover, are of importance, as they indicate the most advantageous methods of applying the guanos, and for what crops and what soils they are best adapted. But for the knowledge of their composition thus acquired, the best Peruvian guano, rich in ammonia, might be extravagantly employed upon soils that would be almost equally benefited by the cheaper qualities, of which the phosphates are the chief fertilizing ingredients. Upon light soils especially, the ammoniacal guano may be used to waste, owing to the little obstruction they present to the escape of its volatile and very soluble portions; the full benefit of these will be secured only in the strongest soils, or in composts prepared with the view of their absorption and retention. In such mixtures guano is used most advantageously. Of itself alone it may furnish all the ingredients required by the plants; but its activity and evanescence need to be checked, and on account of its caustic quality care should be taken that it be not brought in direct contact with the seed. The quantity of best guano that should be employed to the acre is generally rated at from 3 to 5 cwt.; and it should be applied in wet weather, when the rains diffuse it equally through the soil. The Peruvians, it is said, irrigate immediately after applying it. They use it only for Indian corn and potatoes, burying about half a handful near each root when the plants are perhaps half grown, and adding some water "to fix the guano." In this country it is found to be an excellent top dressing for grass and young corn, and is a most efficient manure for all the root crops.—The search for new localities of guano led to the discovery in 1855 of animal deposits of the same original nature upon the groups of islands lying off the coast of Guiana and Venezuela. Immense flocks of sea fowl frequent these islands for the purpose of laying their eggs. But being in the region of the tropical rains, the deposits of excrement and other organic matters are subject to chemical

changes, from which result singular products, very different from those of the earthy guano of the dry islands of the Pacific. The principal groups which furnish these products are Los Monges (Monks' island), El Roque, and Centinella. Some of the islands are low, and strewed with sand, which is made up of comminuted coral, madrepore, and shells, in which the birds lay their eggs. Others rise in peaks to the height of 800 ft., and upon these are stratified rocky layers of metamorphic guano, sometimes covered with the deposits still in process of accumulation. Several qualities of guano are recognized, one of which is arenaceous, in grains as coarse as mustard seed, light yellowish brown or nearly white when dried, exhaling an odor not ammoniacal, but like that of freshly dug earth. Its average composition is thus stated by Dr. A. A. Hayes: moisture, after drying, 4.40; organic matter, 6.40; bone phosphate of lime, 46.60; carbonate of lime, 39.80; phosphate of magnesia, 1.20; sulphate of lime, 0.80; sand, 0.21; traces of chloride and sulphate of soda; total, 99.41. The ammonia or nitrogen in the organic matters does not exceed 2 per cent. of the whole. Another variety is in aggregated grains, the first step in the change of the material into rock. It differs in composition from the preceding principally by loss of carbonate of lime and increased proportion of bone phosphate. A third variety is a solid rock, which forms a crust sometimes 2 ft. thick over the lower portions of the deposit, and is the product of the change that has taken place upon the surface of the mass. Its composition is somewhat variable at different localities; but it is everywhere distinguished by the disappearance of carbonate of lime and large increase in the proportion of phosphate and sulphate of lime. The carbonate of lime has been decomposed by the acids generated in the fermentation induced by the moisture at the prevailing elevated temperature, and with other soluble matters has been removed by the rains. The passage of the gaseous exhalations through the mass, gradually thickening as its aqueous portion evaporates and the salts gather at the surface, renders its structure porous and cellular, and so much like that of some trachytic rocks that the substance has been mistaken for one of igneous origin, or at least metamorphosed by heat. The granular structure has given place to a compact, close texture, and a mineral appearance and hardness closely approaching that of feldspar; and in some specimens are observed angular fragments and grains hardly to be distinguished by the eye from epidote. The external surface has an uneven weathered appearance like that of trap rock, and is of a lighter color than the body of the rock within. Various analyses have been made of this substance by different chemists, and it is found to consist principally of phosphoric acid and lime, the former generally ranging from 37 to 46 per cent., and the latter from 39 to 41 per cent., of which a small

portion is combined with sulphuric acid to form sulphate of lime, the proportion of this sometimes exceeding 8 per cent., and the crystals being visible in the cells of the mineral. Water and organic matters sometimes exceed 10 per cent. In the body of the rock the phosphoric acid is found combined with two atoms of base and one of water, in the form of common phosphate of lime; while the external part is a combination of an atom of acid with three of lime, forming the so-called tri-phosphate of lime. The acid is also sometimes combined in small proportion with iron, alumina, and magnesia. Soda is present in some samples to the amount of 2 or 3 per cent. Much of the guano rock closely resembles in appearance the phosphate of lime rocks of the older crystalline formations; and it affords a remarkable instance of the conversion of modern collections of organic substances into what appears to be an ancient rock. Though traced directly into the mass of these substances with which it is associated, and the derivation of which is obviously from the digested bones of fishes and other food of birds, from comminuted shells, and the remains of the birds themselves and of their eggs, all vestiges of animal life have as completely disappeared in the hard strata as they have from the true metamorphic rocks, the changes in which we have been accustomed to ascribe to intense heat produced under the pressure of superincumbent mountains of rock, and exerted through long and indefinite periods.

GUAPEY. See RIO GRANDE.

GUARANA, a paste formed chiefly from seeds of *Paullinia sorbilis*, and perhaps *P. cupana*, climbing shrubs of the order *sapindaceæ*, growing in Brazil and on the banks of the Orinoco. The paste is dried into rough, hard, reddish brown masses, which may be reduced to powder. It is habitually used by the Brazilian Indians as a part of their diet, either mixed with other articles or as a drink. It is said to contain more than 5 per cent. of a crystallizable principle identical with caffeine, and has in addition tannic acid and two or three volatile oils. It has long been used in Brazil as a medicine, especially in the treatment of diseases of the bowels; but although known in Europe for a number of years, it has only recently received much attention. Its action upon the system in a state of health is apparently negative, as it affects neither pulse nor temperature. An increased capacity for mental labor, moderate wakefulness, and an influence upon the nervous system, similar to that produced by tea and coffee, have been observed. It evidently acts somewhat like a tonic; but more accurate observations than any we now possess are requisite in order to determine its physiological action upon the system. It has recently been used both in this country and Europe with advantage in the treatment of headaches, especially those of a nervous character. It renders the greatest service in such cases when it is administered near the commence-

ment of an attack, and repeated at short intervals. It is best given in milk, and should be repeated if necessary at intervals of half an hour, three or four times, in doses of from ten grains to half a drachm. In other nervous affections it has been tried, especially in nervous derangement of the stomach, but in these it has not been found useful. Its action closely resembles that of tea and coffee. A fluid extract has also been made. Its administration is contra-indicated by an inflammatory condition of the system.

GUARANIS. See TUPÍ-GUARANIS.

GUARANTY. This word is derived from the old English word warrant. The Latin and the Norman French languages, not having the letter *w*, in spelling this word and many others used the letter *g* instead of *w*, as in the name Wilhelm or William, which is in Latin Guillelmus, and in French Guillaume. Thus the barbarous word *guarantiso* came into use in law proceedings, although the even more barbarous word *warrantiso* was also used. Gradually the words became distinguished in their meaning; and at present it is found very convenient to use the Latin form *guaranty* in one sense, and *warranty* in a different although an analogous meaning. A guaranty is a promise that some other party (who is called the principal) shall pay a debt, or discharge some duty, or perform some act; and to answer for the consequences if the principal fails to do what is thus promised. It is an extremely common business transaction; and we shall endeavor to give the principal rules by which it is governed.—Every indorser of negotiable paper is in fact a guarantor; but in such a peculiar way, that the law attaches to him duties on the one hand, and on the other gives him rights, not known to common guarantors. (See NEGOTIABLE PAPER, and PROMISSORY NOTE.) Every surety also is a guarantor, and the law for guarantors and for sureties is in many respects similar, but in other respects different. (See SURETY.) In the first place, a guaranty is not in general negotiable; by which is meant that it cannot be transferred in such a way as to give the transferee the right of suing upon it in his name, or, if this be permitted, of suing with all the rights and advantages of an original holder. In the next place, although it is a promise only to pay the debt of another, the guarantor may be held, although the promise of that other was voidable by him who made it, and could not be enforced at law; as if it were the promise of an infant, and not for necessities, or of a married woman. In fact, guaranties are very often taken for the very reason that the debt or promise guaranteed is one which has no value by itself. But generally, the liability of the guarantor is measured and determined by that of the principal, or the party whose debt or promise is guaranteed. No especial words or phrases or form of instrument is necessary to constitute a guaranty. The intention must be manifest, and the words must be such as may

be construed into an expression of that intention; and this will be sufficient. The contract of guaranty is one which is construed, if not severely, at least exactly. Thus if A guaranties the notes of B, he is not bound for notes which B signs jointly with C; and if B changes his business or the nature of his debts, so as to throw upon A a liability distinctly different from that which it was his intention to assume, A is thereby discharged from his guaranty.—The guarantee (or party guaranteed) must preserve all the securities he has of the principal debtor unimpaired, because if the guarantor pays the debt, he is entitled to all these securities; and a court having equity powers will, upon cause shown, compel the guarantee to do what he can to turn these securities to account for the benefit of the guarantor, if the guarantee alone can do it, or can do it to the most advantage, before it will permit him to call upon the guarantor. Indeed, it may be regarded as a fundamental proposition of the law of guaranty, that the guarantee shall act with entire fairness toward the guarantor, and shall do all that can properly be done to lessen his burden. Therefore if the creditor, being guaranteed, agree with the principal to reduce his debt in any certain proportion, he shall be understood to make the agreement for the guarantor's benefit as much as for his own, and therefore the guaranty shall be reduced in the same proportion. Still, however, it seems to be generally held that the guarantor's right is confined to the securities for the debt, and does not extend to the debt itself; if therefore a guarantor pays a debt, it is said that he has no right to demand from the creditor a transfer of the debt itself, or of the note by which the debt was evidenced, for the reason that this very debt has been already paid or discharged by himself as guarantor. But he may demand, with the securities, the note itself, or a transfer of the debt, if this be necessary to make the securities available; and it would be difficult to resist his right, we should say, to be subrogated to the creditor's claim, so far as he could make that available to himself. But the law on this point can hardly be considered as distinctly settled.—The promise to pay the debt of another, like every other promise known to the law, must rest upon a good consideration, or it cannot be enforced by legal process. The law on this subject is a little nice in respect to guaranties; for while it demands inexorably that there should be a consideration, it sometimes declares that if the promise which is guaranteed rests upon a good consideration, this same consideration shall be sufficient to sustain the promise of guaranty; but if the guaranty is given subsequently, after the consideration for the original promise is executed and passed, so that it can have no force or application whatever to the new and distinct promise of guaranty, the latter will require a new and distinct consideration for its support. But to make this consideration suf-

ficient, it is not necessary that anything shall pass directly from him who receives the guaranty to him who gives it; for if the party for whom it is given, or the party by whom it is given, receive any benefit, or the party to whom it is given suffer any loss or injury, from or by reason of the promise of guaranty, it is a good consideration. The guarantee must conduct himself in all respects with entire good faith, and if there be any taint or fraud about the consideration (as, for example, if a guaranty is given for a certain amount of goods sold, and the seller has made an arrangement with the buyer whose debt is guaranteed, by which arrangement the buyer is to pay him more than the true price, the difference going toward an old debt due from the buyer to the seller), this is a fraud upon the guarantor, and he is discharged not only as to this unfair excess, but as to his whole promise of guaranty.—A guaranty, being a promise to pay the debt of another, is precisely within the clause of the statute of frauds which requires that such a promise be in writing and signed by the guarantor. It often happens, however, that a guaranty, or a contract which has all the appearance of a guaranty, and which is not in writing, is still enforced by the courts. This occurs when they can hold the promise to be an original promise, and not a collateral promise. For an original promise is a promise to pay one's own debt; while a collateral promise is a promise to pay a debt which is primarily the debt of another. This is a very nice and difficult question, and has been very variously decided. The disposition of the courts so to construe and apply the statute of frauds as that it shall not be an instrument of fraud, has led them to some strange decisions. Comparing the cases, and drawing from them the true principle which must govern the question, we should say the rule must be this: If one who promises to pay the debt of another receives an independent consideration for his promise, and thereby enjoys a benefit or advantage which is entirely his own, and which he would not have enjoyed but for the transaction, then the promise is to be regarded as his promise to pay his own debt, and therefore needs not to be in writing. As an illustration of this question, which is frequently recurring and always difficult, we should say that if the creditor had attached the property of the original debtor, and the alleged guarantor had requested that the attachment might be discharged and agreed to pay the debt if it were, and the attachment was then discharged and the property set free, this would not be enough to make it the guarantor's promise for his own benefit, or his original promise, and therefore it could not be enforced, unless it was in writing. But if the alleged guarantor had requested not only that the attachment should be discharged, but that the property should be delivered over to him for his own advantage, this new element would make his promise one for his own benefit, or, in the language of the law,

an original and not a collateral promise, and therefore it needs not to be in writing. So, if A delivers goods to B, at the request of C, who is to pay for them, and who may be considered as the buyer of them, C, when he promises to pay for them, promises to pay his own debt, and therefore the promise may be in spoken words only. But if A sells goods to B, on C's promise to pay for them if B does not, then A's promise is only collateral to B's, and it must be in writing. The question therefore is, were the goods sold to C for the benefit of B, or were they sold to B on C's guaranty? On this question the seller's entry in his books is sometimes very important evidence. If he charges C with them primarily, this may not go far to bind C, because he may have charged them so for the very purpose of holding C. But if he charges them simply to B, it will be very difficult for him to prove afterward that he considered himself as selling them to C, and not to B on C's guaranty. But still he might show that even this entry was made by mistake, and did not represent the truth.—The contract of guaranty, like every legal contract, requires two parties, who agree to the same thing. It follows therefore that a guaranty, or a promise to pay the debt of another, is not valid until it is accepted; and this is true, whatever be the consideration, and whether it be in writing or otherwise. But this acceptance need not be direct and unequivocal; indeed, it need not be in any words whatever; it may be implied from circumstances. Thus, if A goes with B to C, and says to C, "If you will sell B the goods he wishes, I will see that he pays you the price," and C, without reply to A, turns to B and sells and delivers him the goods, there would be no question in this case as to whether C accepted and acted upon the guaranty of A. It is under a different class of circumstances that this question generally arises. Thus, if the guaranty were by letter, and referred to subsequent operations, the question would then arise whether there was a sufficient acceptance of it. Some courts have asserted that the guarantor had a perfect right to know whether his offer was accepted, and whether he stood bound as guarantor; and some have gone so far as to hold that the guarantor was entitled to know at once, not only that his guaranty was acted upon, and the amount, but all the terms of the sale which it could be desirable for him to know, that he might arrange accordingly. On the other hand, courts of the highest authority have held, that where an offer of guaranty is absolute, and does not expressly or by distinct intimation call for any acceptance or any special information, the party making the offer might suppose it to be accepted and act on that supposition; and the party receiving the offer may act under it and within the terms of it, and hold the guarantor without giving him any notice of his acceptance. It has already been said that the party receiving the guaranty must conduct himself

with good faith and proper care toward the guarantor; and one effect of this principle is, that if any material change is made in the extent or the terms or character of the liability of the principal, this discharges the guarantor. Nor will a guarantor be held in such case by the party guaranteed showing that the change was in no way injurious to the guarantor; because he has a right to judge for himself as to the circumstances under which he is content to be liable, and he may stand upon the precise terms of his contract. The guarantor may, however, assent to such a change, and then he will be held. Thus, if a new note be given for an old one, this discharges the guarantor on the old note; and it has been held that if a guarantor thus discharged, in ignorance that his liability has thus terminated, makes a new acknowledgment of this liability, he cannot be held thereon. So, a guaranty to a partnership is discharged by a change in the partnership, although no change in the firm or style of it be made; and this has been held where the guaranty was given "for advances made by them, or by either of them." The reason given is, that the guarantor may have trusted to the skill or care of the members of the firm as they stood when he gave his guaranty; and the change of a single member may be important in this respect. It should be stated, however, that the guaranty itself may provide expressly for all these changes, and will not, of course, be affected by any which it anticipates.—Whether a guaranty be a continuing guaranty, or be intended to cover one single transaction only, is sometimes a difficult question. In general, however, a guarantor who intends to limit his liability to a single transaction should so express it; but if it can be gathered from the terms of the guaranty that it was intended and should have been understood to apply to more than one transaction, it will be so held. The limit may be one of time, as to be liable for any amount of goods sold before a certain day; or one of amount, as for any goods up to a certain sum.—That a guarantor is entitled to a reasonable protection we have already seen, but it has been much disputed whether, on this ground, he may insist that the party guaranteed shall proceed forthwith against the debtor. It would seem to be very unjust to the guarantor to permit a creditor to let his debt lie without taking any steps to secure it, because he knows that the guarantor is perfectly responsible, and he chooses to indulge some feeling of personal kindness to the debtor. This question has frequently come before the courts, especially in New York; and it must be admitted that the law is not quite certain. We think, however, that this rule may be drawn from the best authority, and sustained by strong reasons, viz.: that the guarantor is not discharged by mere delay of the creditor in calling on the debtor; but if after a request from the guarantor that he should proceed (especially if the request be accompanied by an offer to pay the costs of

proceeding), the creditor delay the demand and all proceedings so long and so stubbornly as to indicate great negligence if not fraud, and the guarantor can show that by such delay he has lost the means of indemnifying himself, the guarantor is now discharged, at least to the extent of the injury which he can show that he thus received. Nor is a creditor prohibited from giving to his debtor all indulgence whatsoever. He certainly may favor him in some respects without discharging the guarantor. After some fluctuation the law seems to have settled down upon the following rule: Mere forbearance of the debt, without fraud, does not discharge the guarantor; nor does an agreement to forbear, provided this is not so binding on the creditor as to prevent his suing the debtor at any time. That is, the creditor must retain the power of putting the debt in suit at any time; but if he retain this power, any forbearance consistent therewith does not discharge the guarantor. The reason is, that the guarantor has the right of paying the debt at any time after it is due, and so acquiring the right of suing it at once; and if the creditor destroys this right by putting the debt in such a condition that it cannot be sued at once, he deprives the guarantor of a valuable right, and so loses his hold upon him. Reasonable notice should also be given to the guarantor of the failure of the debtor, so that he may have all proper opportunity of obtaining indemnity. But what this reasonable notice should be is not quite settled. There is no time fixed, as in the case of indorsed paper, within which the notice of non-payment must be given; and perhaps the rule may be stated that no mere delay of notice would discharge the guarantor, unless he can show that he has suffered injury by such delay. But if he can show that if he had received this notice within a day or two from the time when the debt was unpaid, he might then have secured himself, and has now lost the opportunity, even that delay might suffice to discharge him.—Guaranties are sometimes given by one expressly in an official capacity as trustee, church warden, executor, assignee, and the like. But the guarantor is still held personally on this guaranty, unless, 1, he holds that office, and 2, has a right by virtue of the office to give the guaranty in his official capacity.—Every guaranty may, in general, be revoked at the pleasure of the guarantor, by giving due notice to the party guaranteed, unless, 1, the guaranty is given upon some continuing consideration which is not yet exhausted, and cannot be restored or rescinded; or, 2, upon some specific transaction, which is not yet wholly completed; or, 3, the guaranty is against the misconduct of some servant or officer, whom the guarantee cannot at once dismiss, or secure himself against by other means, if the guaranty be rescinded.

GUARATINGUETA, a town of Brazil, in the province of São Paulo, on the right bank of the Rio Parahyba, 120 m. W. of Rio de Ja-

neiro; pop. about 7,600. The streets are regular, but narrow, and the houses built of adobe. It has a church and three chapels; one of the latter, outside the town, is visited by numbers of pilgrims. The surrounding country is fertile, and sugar, coffee, and tobacco are cultivated, and, with fat cattle and swine, are sent in considerable quantities to Rio de Janeiro and to São Paulo.

GUARD, National, a system of militia instituted in France in 1789. The court had concentrated at the gates of the capital an army of 30,000 regular troops. To counteract this demonstration, the citizens demanded arms, and on July 13 a municipal council decreed the formation of a militia of 60 battalions numbering 48,000 men. White, the color of the royal standard, was united with the blue and red colors of the city of Paris to form the color of this revolutionary force, afterward so famous as the tricolor. The other cities of France promptly followed the example, and the institution took the name of national guard. In 1795 the national guard of Paris, to the number of 30,000, rose in arms against the convention, Oct. 5, and attacked the Tuileries, but were repulsed and defeated by 6,000 regular troops commanded by Napoleon Bonaparte. The national guard was now placed under the authority of the commander-in-chief of the regular army. During the revolution of July, 1830, the national guard was revived at Paris, and on July 30 Lafayette, who 40 years before had commanded the first national guard, was again made commander-in-chief. After the revolution of 1848 the national guard was largely increased, and by a law of June 26, 1851, it was organized throughout France, and made to include all citizens above the age of 20, except regular soldiers and persons employed in the service of the government. After the *coup d'état* of Dec. 2, 1851, it was dissolved, and re-established by a decree dated Jan. 11, 1852, on a new and much restricted plan, reducing it to the condition of a mere armed police for the repression of tumults. During the Franco-German war the national guard was reorganized. After the evacuation of Paris by the Germans and the ratification of peace by the national assembly, in the early part of 1871, the national guards still remained under arms. They refused to obey the orders of the government to disarm and disband, but seized a number of guns, and occupied the batteries of Montmartre and the quarters of Belleville and Villette. After the overthrow of the commune, the national assembly voted the dissolution of the national guard throughout France.

GUARDIAN, one who guards, or has the care and charge of another. Guardians in law are of many kinds. There are guardians of minor children, and of those incapacitated otherwise than by age from taking care of themselves. Guardians of infants (minors) were, at common law: 1. Guardians by nature. In exact and technical construction, by this term is meant

only that guardianship which belonged to the ancestor, in respect to the heir apparent. It extended only to the care of the person, and did not include the care of the property. 2. Guardians by nurture. This guardianship also extended only to the person and not to the estate; and it terminated when the ward was 14 years of age, whereas guardianship by nature continued until the ward was 21. It was given to the father, and if no father, to the mother. 3. Guardians in socage, limited to cases where the minor had lands by descent; and this guardianship extended over these lands and the person also, until the ward was 14 years of age. It fell by common law to the next of blood to whom the inheritance could not descend, and therefore this kind of guardianship could hardly have existed in the United States. 4. Guardians by statute; and 5, guardians by will, or testamentary guardians. These last two are almost the only ones known practically in this country (by statutes following that of 12 Charles II.), whereby a father has power to appoint by will a guardian for his minor children; and if such appointment be not made, or fails, the court of probate, or some other court exercising similar powers, makes the appointment. The statutes of different states make somewhat different provisions as to the persons to be appointed (usually the next of kin of proper age), the degree and way in which the minor is to be consulted, the bonds to be given, and the power and the duty of the guardian.—All guardianship is a personal trust, and is therefore not transferable by assignment, devise, or inheritance. Whether it expires by the marriage of a female ward who is still a minor is not certain, but, we think, probable. It seems that as to a male ward marrying, the distinction has been taken that it terminates the guardianship as to his person, but not as to his estate. The law can hardly be said to be settled in the United States generally as to the effect of the marriage of the ward. The marriage of a female guardian terminates her authority in some states by statute, and in others, generally at least, by practice. A married woman cannot be appointed guardian without the consent of her husband; but with that consent she may be.—The guardian has very full power over the personal estate of the ward, but very little over the real estate, any further than relates to the rents, issues, and profits, and to necessary law proceedings. He cannot dispose of the real estate generally, without an order from a court having jurisdiction, and can lease it only for the minority of the ward. Generally, in the United States, it is more proper and more safe for the guardian to get the authority of a proper court, before even converting the personal property of an infant into real estate, and certainly before attempting any transfer or any burden of the real estate. In some of the states there are general statutory provisions as to investments which guardians and others in trust may or may not make. The

guardian is not permitted to make any profit out of the ward's property, or to use it in his own business or speculations; nor can he act for his own especial advantage in any transaction relating to the property of the ward. If he make a beneficial bargain about the property or interests of the ward, the whole of the benefit must be transferred by him to the ward's estate. If he cause or suffer any waste or damage to the ward's property, he must refund in full damages, and in some states in treble damages. And in settlement of his accounts a court will sometimes charge him with compound interest, where it seems that he has himself been deriving from the use of the ward's property a profit equal to that. So if he use his ward's property in his own business, the court will decree to the ward all the capital, with all the profit it has made if this be more than interest; or if it be less or none, it will decree the capital with interest (which may be made compound if the court see fit), because it was the duty of the guardian to invest the property so that it would earn this safely. If he promise, on sufficient consideration, to pay the debt of his ward, he is personally bound, although the ward's estate fails to pay the debt, and he described himself as guardian, unless it was a specific part of the contract that he should be held only so far as the funds sufficed, or should not be held personally; and if he discharge the debt of his ward lawfully, he may charge it against the ward in his accounts, or, if he be deprived of his guardianship, or the ward become of age, he may have his action against the ward for the amount. If the ward enter into a contract or make a promise, the guardian cannot be sued thereon, but the action must be brought against the ward; and the guardian may make any lawful defence for the ward.—Besides the general guardian (whether he be appointed by will or by the court), it is common for courts to appoint a guardian *ad litem*, to represent and act for the ward in the settlement of the guardian's accounts, or in or for any other legal proceedings, where it seems proper that such appointment should be made. Guardians are also appointed generally in the United States for the insane and for spendthrifts. The manner of the appointment is regulated everywhere by statute; and the general principles already stated in reference to guardians of infants are equally applicable to other guardians, with such changes only as the difference in the nature of the case may make necessary.

GUARINI, Giovanni Battista, an Italian poet, born in Ferrara, Dec. 10, 1537, died in Venice, Oct. 4, 1612. Having become at an early age a professor at Ferrara, and for some time lectured on the ethics of Aristotle, he entered the service of Alfonso II. of Ferrara, and was intrusted with diplomatic missions to Venice, Savoy, the pope, the emperor, and Poland. He also served Ferdinand I. of Tuscany and the city of Ferrara. His best productions are

his comedy *L'Idropica*, his dialogue *Il segretario*, his *Rime* and *Lettere*, but particularly the drama *Il pastor fido*, which passed through 40 editions in his lifetime, has been translated into nearly all European languages, and found many imitators, although itself an imitation of Tasso's *Aminta*. An incomplete edition of his works appeared at Verona in 1737-'8 (4 vols. 4to); his *Trattato della politica libertà* was first printed at Venice in 1818, with his life by Ruggieri.

GUARNERI, or *Guarnerius*, the name of a family living at Cremona in the 17th century, some of whose members are celebrated as violin makers.—**ANDREA**, born about 1630, worked at his art from 1650 to about 1695. His instruments are mostly inscribed *Andreas Guarnerius fecit Cremona sub titulo Sanctæ Teresæ*. He was a pupil of Nicolò Amati, whose workmanship he imitated with some slight differences of detail. The tone of his instruments is sweet but not powerful. They rank in the second class.—**GIUSEPPE**, his son and pupil, in middle life made his instruments like those of Stradivarius, and later imitated his cousin Giuseppe Antonio.—**PIETRO**, second son of Andrea, lived at Cremona till 1700, and then at Mantua, and his violins bear the names of both these cities. He worked from 1690 to 1725, and his instruments were inferior to those of his father.—**GIUSEPPE ANTONIO**, nephew of Andrea, born June 8, 1683, was a pupil of Stradivarius, and the most renowned of the family. He possessed genius, but led an irregular life, much of it marked by idleness and intemperance, and a part of it spent in prison, where he died in 1745. Naturally his productions were unequal, some of them being of consummate workmanship, and others poor in material used and in method of construction. These last belong to the later years of his life, his prison days. He worked from 1725 to 1745, and his violins were mostly inscribed "Giuseppe Guarnerius, Andrea Nepos. I. H. S." From the use of this latter symbol he was commonly known in Italy as Guarneri del Gesù. His earlier works do not show much care either in the choice of woods or the varnish. Many of those made in his middle epoch are superb, distinguished for harmony of form, beauty of color, the care with which the different woods composing the instruments were selected, and the adaptation of the curves and thickness to the production of the finest tone. To these noble instruments succeeded others inferior in all respects. Paganini and Alard were both accustomed to use Guarnerius violins at their concerts.—Violins and basses exist, dated from 1725 to 1740, made by **PIETRO**, son of Giuseppe.

GUASTALLA, a town of Italy, in the province of Reggio, at the junction of the Crostolo and the Po, 18 m. N. E. of Parma; pop. about 10,000. It is well built, is surrounded by walls, and contains a cathedral, eight churches, a decayed castle, a public library, a theatre, a musical academy, and several educational and charitable institutions. It was

founded by the Lombards, and during the middle ages passed successively into the hands of several Italian families and states. Subsequently it was made a fief of the German empire, and was raised to a duchy in 1621. By the treaty of Aix-la-Chapelle (1748) it was given to Don Philip of Spain, duke of Parma. In 1796 the French united it and the surrounding region to the Cisalpine republic. In 1805 Napoleon gave it to his sister Pauline, whose husband, the prince Borghese, was created duke of Guastalla. In 1815 the congress of Vienna allotted it, together with Parma and Piacenza, to the ex-empress Maria Louisa, upon whose death in 1847 it passed to the duke of Lucca, who in accordance with a previous arrangement ceded it to Modena, with which it was in 1860 incorporated into the dominions of Victor Emanuel.

GUATEMALA. **I.** A republic of Central America, lying between lat. 13° 50' and 18° 15' N., and lon. 88° 14' and 93° 12' W., bounded N.



by Yucatan, E. by British Honduras, the bay of Honduras, and the republics of Honduras and San Salvador, S. by the Pacific ocean, and W. by the Mexican state of Chiapas. Its greatest length from N. E. to S. W. is 325 m., greatest breadth about 300 m.; area estimated at 40,777 sq. m.; pop. about 1,200,000. The Pacific coast presents a slightly convex line extending from S. E. to N. W.; the shore being in some parts extremely low, and in others high and rocky, and bordered with a succession of rocky barriers not far from the mainland. The Atlantic shore line is very irregular, presenting here and there abrupt cliffs reaching to the very edge of the sea. The only port now frequented to any considerable extent on the Pacific side is that of San José, which, however, has only an open roadstead which affords no shelter for shipping; debarkation is at all times difficult, and sometimes

impossible for weeks together. San José is a miserable village of not more than 200 inhabitants, mostly Indians, situated at the mouth of the river Michatoya. One or two other ports further northward might be available but for the want of an adequate population. The port of Izabal, on the Atlantic side, situated on the S. shore of the gulf of Dulce, which communicates with the sea by the river Dulce, is a wretched place of about 150 houses, and owes its importance to its proximity to the capital, for all the merchandise *in transitu* to and from which it is the exclusive port of reception on that side of the republic. The shallowness of the water on the bar at the mouth of the river closes the port to large vessels. Santo Tomas, on the bay of Honduras, is the principal seaport of Guatemala; it has a picturesque harbor, sheltered by high mountains, and always affording safe and commodious anchorage for ships of the deepest draught, which moor close to the shore in six fathoms of water.—Almost the whole surface of the republic is composed of an elevated plateau, which is a continuation of the table land of Yucatan, intersected by numberless mountains, with deep and extensive valleys, particularly in the west and northwest, adjacent to Chiapas; but no continuous chain traverses the country. The depression of the table land toward the Pacific coast, however, is so rapid and presents so many steep acclivities that, when viewed from the sea, it looks like an elevated mountain range; the illusion is the more complete as the edge of the plain appears marked by a number of volcanoes, some of which are still active. Remarkable among the extinct volcanoes is the Volcan de Agua, so named from a torrent of water which burst from its crater in 1541 and overwhelmed the first city of Guatemala, the ruins of which still exist under the name of Ciudad Vieja. It has an elevation of about 14,000 ft. above the sea. Near it is the Volcan de Fuego, which vomits forth fire and smoke every day, and which, with the Volcan de Agua, and that of Amilpas (13,200 ft. high), constitutes the principal volcanic hearth of Central America. Other volcanoes are Sapotitlan and Atitlan, each nearly 13,000 ft. high. All the volcanoes of Guatemala, whether extinct or active, are in the same line with those of Nicaragua and San Salvador. The shore region consists of a strip of flat low country, not more than 30 m. broad. The slope of the plain eastward to the bay of Honduras is intersected by detached mountain groups, forming parallel ridges, which nowhere attain a greater elevation than 500 or 600 ft. above the plain, and alternate with extensive valleys. Some of these heights reach to the shores of the sea; but to the W. and N. W. of the gulf of Dulce they are entirely lost in a low plain. The table land attains an elevation of 5,000 ft. in the volcanic zone; and the maximum height is reached in the vicinity of Quetzaltenango, at the S. border of the department

of Vera Paz.—Little is known of the geological structure of the country. Although gold, silver, copper, and iron are sufficiently abundant to be worked with profit, the only mining operations are those in the department of Totonicapan, where lead mines are worked in the vicinity of Chiautla, chiefly by the Indians.—Salt is made from springs near Ixtatan in the same department, and in large quantities on the Pacific coast. Sulphur is found in great quantities, and jasper is abundant.—The country is watered by numerous rivers, the principal of which is the Usumasinta, whose main stream rises in the mountains near San Gerónimo, flows W. by N. 150 m., receives the waters of the Lacandones, and thence, bending N. and afterward N. W., leaves the republic and falls into the gulf of Mexico through the Lago de Términos in Yucatan. Throughout the whole course of this river in Guatemala, about 350 m., it is unfavorable to navigation. Its affluents are numerous. The Motagua, descending from the S. declivities of the same mountains as the Usumasinta, curves around their base, and, after a course of nearly 300 m., falls by several mouths into the bay of Honduras, near the E. boundary of the republic; in the upper portion it is called the Rio Grande; it is only navigable by canoes and barges. The Polochique, which rises in the hills adjacent to Coban, is a large, deep, and beautiful stream, 150 m. long; but owing to the rapidity of its current, and a bar across its mouth with but 4 ft. of water, it can only be navigated by light craft. On the W. side, a host of minor streams hurry down to the Pacific by short precipitous courses, one of them, the Michatoya, passing the port of San José. Among the many lakes, a few of which are of considerable size, are Dulce, through which the most of the shipping traffic is carried on; Amatitlan, near the town of the same name, 12 m. long by 3 m. broad, and remarkable for the large pieces of pumice stone lying along its shores and floating on its surface; and Atitlan, 30 m. long by 10 m. broad, in which no soundings have been found with a line of 300 fathoms, and which, though fed by numerous rivers, has no visible outlet. Peten lake, in Vera Paz, is about 70 m. in circuit, and dotted with a number of islands, on the largest of which stands the town of Flores. At Quirigua and other places are remarkable ruins, which attest the high proficiency of the ancient inhabitants in architecture and sculpture. (See AMERICAN ANTIQUITIES.)—The climate, excessively hot in the low and cool in the elevated regions, is generally salubrious. During the wet season, from May to October, heavy rains fall, though rarely in the forenoon. Snow is seldom seen, but frosts are frequent. The highlanders are much afflicted with goitre and cretinism. Earthquakes are frequent, and at times disastrous. The soil is exceedingly fertile; but agriculture is rudely conducted with the same kind of implements used by the first colonists. Modern machinery, however, has

been introduced by some of the wealthier planters. Maize, wheat, and other cereals, cotton, sugar cane, and tobacco are extensively produced; but the chief staple is coffee, the cultivation of which began in 1872, to take the place of that of cochineal, owing to a distemper prevailing among the insects. Indigo, cacao, and vanilla are abundant; the vine and olive thrive well in the valleys; and the supply of tropical fruits, and of those of the temperate zone also, is very plentiful. The arboreal vegetation is remarkably luxuriant. The fauna of Guatemala precisely resembles that of Mexico, to which the reader is referred. Horses, mules, black cattle, sheep, swine, and poultry are reared in large numbers, particularly in Totonicapan, Quezaltenango, and Chiquimula. The manufactures consist of cotton and woollen fabrics for home consumption, such as ponchos and *jergas* (coarse stuffs); and in Totonicapan the inhabitants are mainly occupied in making household utensils of earthenware, wood, &c. The value of the exports in 1871 was \$2,747,784. In Guatemala, as in other Hispano-American countries, the want of adequate highways is a great hindrance to the development of the material resources; the chief signs of awakening energy on the part of the government in this respect were the making of one or two new roads in 1860 and following years, and the ordering a bridge to be built over the Rio Negro in 1872.—The territory of Guatemala is divided into seven departments or *corregimientos*: Guatemala, Sacatepeque, Solalá, Quezaltenango, Totonicapan, Chiquimula, and Vera Paz. The population is made up of whites (12,000), mostly descended from the early Spanish settlers; mestizos or *ladinos* (430,000), the children of whites and Indians; negroes, pure and mixed (8,000); and pure-blooded Indians (750,000). The Indians mostly live by themselves, and the civil authorities immediately governing them are commonly chosen from their own race. The different families are mild, temperate, and industrious, unless corrupted by military chiefs, when they become rapacious, fierce, and barbarous. Indolence and licentiousness are the besetting vices of the other classes of the population. By the constitution of Oct. 19, 1851, the legislative power is vested in a congress consisting of a council of state and a house of representatives, the former with 24 members elected by the 52 members of the latter, these being elected by the people, and both for a term of four years. The executive power is vested in a president, elected for a like period, who is aided by the three ministers of interior and justice, foreign affairs, and war and finance. The chief sources of the national revenue are the customs, direct and indirect imposts, and the tobacco monopoly. The revenue amounted in 1872 to \$1,798,000, and the expenditures for the same year to \$1,785,000. In 1869 a loan of \$2,500,000 was contracted in England, including which the total debt of Guatemala

in 1872 was \$4,320,000. Besides this debt, there is another floating debt, the amount of which is unknown. Education, for a while so much neglected that of 280 public schools which existed in the republic in 1860, with about 7,000 pupils, scarcely half were open in 1865, is now again becoming an object of importance in the eyes of the government. A free school was established at Quezaltenango in 1872, toward which many citizens gave handsome contributions, and the governor his entire salary for that year. The Roman Catholic is the only religion tolerated.—The coast of this region was discovered by Columbus in 1502; the country became a Spanish dependency in 1524, and was erected into a captain-generalcy in 1527 by Charles V. In 1821 Guatemala threw off the yoke of Spain, and was annexed to the Mexican empire under Iturbide; but it became a part of the Central American federal republic in 1823. In 1839 the territory of the latter was diminished by the secession of Honduras; and eight years later Guatemala separated from the confederation, becoming an independent republic on March 21, 1847. Guatemala kept out of the many wars which, up to 1862, proved so disastrous to the other Spanish American states; but shortly after that time its finances were considerably embarrassed and its material development retarded by a succession of petty wars. In 1870 several towns and villages were severely damaged by earthquakes. In May, 1871, a revolution broke out against President Cerna, and terminated in his deposition by Granados, who was installed in the executive chair. The new government was soon obliged to exile the archbishop of Guatemala, and banish the Jesuits, who were charged with stirring up a new revolution in favor of Cerna. The port of Champerico was opened in 1872, and a road was to be constructed thence to Quezaltenango. Corporal punishment was abolished in the schools. A law passed in March restricted the liberty of the press. The collection of inland duties was abolished, and all cities were opened to commerce, except those on the frontiers of Chiapas, San Salvador, and Honduras. The order of Jesuits was declared extinct, and its property confiscated. A treaty of alliance offensive and defensive was made with San Salvador in this year, the principal stipulations of which were: mutual protection in the event of internal dissensions; the connecting of the two republics by telegraph lines; and the complete interdiction of the Jesuits. Contracts were signed for the construction of a line of railway from San José to the capital, and of six lines of telegraph, the first of which was to be from Guatemala la Nueva to the river Paz. **II. Guatemala la Nueva** (NEW GUATEMALA), a city, capital of the republic, and of a department of the same name, in lat. 14° 37' N., lon. 90° 30' W.; pop. about 40,000. This city, by far the finest in Central America, stands upon a pic-

turesque plateau 100 ft. high, 3 m. long and 1 m. broad, and occupies the northern extremity of a plain 21 m. long and 12 m. broad, with a mean elevation of 4,500 ft. above the sea. Its situation is unfavorable for commerce, being nearly 90 m. from San José on the Pacific, and 120 m. from Izabal on the Atlantic side. The volcanoes Agua and Fuego rise on either side of the town. The streets, all 40 ft. wide, are laid out with severe regularity; they cross each other at right angles, are badly paved, and not very clean; only a few of them have sidewalks. Water being scarce on the plateau, the supply for the city is brought from a distance of 9 m. by two aqueducts, and distributed by numerous fountains. On account of the frequency of earthquakes, the houses are but one story high, so that at a distance only a monotonous succession of roofs is seen,

relieved here and there by the domes and clock towers of the churches. The houses of the suburbs are mere thatched hovels, separated from each other by hedges or by open spaces. The city proper, however, contains many large and well constructed private dwellings, each surrounding a large courtyard embellished with statuary and fountains, and orange, oleander, and other fragrant and flowering trees. The internal decorations of these mansions are at once tasteful and magnificent, but glazed windows are almost unknown. The most usual building materials are a species of indurated clay, a variety of pozzuolana, and mortar, the walls being universally plastered and whitewashed. The roofs are either flat or covered with tiles; and the general style of architecture is that of the south of Spain. There are several public



Guatemala la Antigua.

squares. The largest, a rectangle 625 ft. long by 535 ft. wide, has on the E. side the cathedral and the archiepiscopal palace; on the W. the governor's palace, ministerial offices, &c., with the mint in the rear; on the N. the city hall; and on the S. a line of shops. In the centre is a fountain and basin formerly surmounted by an equestrian statue of Charles IV., the horse of which alone remains; and a great part of the area is occupied by rows of miserable little huts in which pottery, iron utensils, agave thread, and other small wares are vended, and the rent of which forms a part of the municipal revenue. In the centre of another square is the theatre, equal in size and elegance to any in Spanish America; rows of orange, oleander, and other trees of brilliant flowers and grateful fragrance surround the building, while a profusion of statues, fountains, &c., placed at intervals throughout the

square, enhances the beauty of this the fashionable evening promenade. Foremost among the public buildings is the cathedral, built in 1780, of simple and elegant design, and occupying a space of 450 ft. square. In the decoration of the interior a chaste variety is observed; and there are sculptures in wood and some fine paintings by native artists. There are 24 other churches, a hospital, and a prison. Guatemala has the largest number of educational institutions of any city in Central America; many of the wealthy people of the other states send their children here for instruction. In 1873 there were 27 common schools, mostly supported by private contributions, 16 of them being for females, and a number of schools for the working classes of all ages. Mechanical industry is little cultivated, and the instruments and tools are of the most primitive character. In spite of the diversity

of races and castes, there is little variety of costume. The wealthy adopt the European fashions. The garb of the people consists of a short woollen jacket of native manufacture, cotton pantaloons, a palm-leaf hat covered with oilcloth, and a many-colored serape or shawl. The dress of the women more closely imitates that of their superiors, except that of the Indian women, which is simple in the extreme, being a piece of blue cotton cloth drawn round the body above the hips, and occasionally a white chemise, which is often embroidered, while their hair, interbraided with a red cord, is wound around the temples. The climate is mild, but changeable; the average temperature is 65° F., the maximum 80°, and the minimum 45°. The chief occupations are agriculture and the manufacture of a few coarse woollen and cotton stuffs, earthenware, and other objects for domestic use. The city was founded in 1776, three years after the destruction of the old capital. **III. Guatemala la Antigua** (Old Guatemala), a city, once among the finest in America, and capital of Guatemala, picturesquely situated 30 m. W. of New Guatemala; pop. about 20,000. It was founded in 1524 by Pedro de Alvarado, who named it Santiago de los Caballeros, made a bishopric in 1533, and destroyed in 1541 by a flood of water from the Volcan de Agua, at the foot of which the ruins still stand, designated by the name *Ciudad Vieja* (old city). The city was rebuilt between the Volcan de Agua and the Volcan de Fuego. In 1773, the population being 60,000, it was almost totally razed by an earthquake; and the rebuilding, commenced in 1799, has since continued steadily, the surrounding country being peculiarly suited to the production of cochineal. It had before the earthquake good streets, many fine edifices, 20 monasteries, and 100 churches; the cathedral, now roofless, was 300 ft. long, 120 wide, and 70 high, and lighted by 50 windows.

GUATEMOZIN, the last Aztec emperor of Mexico, nephew and son-in-law of Montezuma, born about 1495, executed Feb. 15, 1525. On the death of Montezuma's brother and successor Cuitlahua, in 1520, he was elected to the vacant throne. The Spaniards, repulsed during the reign of his predecessor, were preparing for a new attack upon the Mexican capital. Guatemozin at once made energetic preparations for defence, which were barely completed when the Spanish army appeared before the city (April 28, 1521) and speedily invested it. The siege was productive of the most terrible suffering to the Mexicans; but they did not yield till exhausted by famine and greatly reduced in numbers by pestilence. Guatemozin, at the entreaties of his family, endeavored to escape by the lake of Tezcuco, but he was pursued and captured. He was first treated with respect by Cortes; but when the smallness of the booty found in the city caused the Spanish soldiers to charge their leader with being in collusion with the fallen

emperor to deprive them of their plunder, Cortes permitted him to be put to the torture, as though to force from him either a confession or denial concerning the treasure. Guatemozin bore the torture (the burning of his feet at a slow fire) with great firmness, and is said to have answered the complaints of the cacique of Tacuba, who suffered with him, with the stoical query, "Do you think, then, that I am taking my pleasure in my bath?" All that was extorted from him was the information that "much treasure had been thrown into the water;" but this statement was probably intended to mislead his captors, as the lake and canals were dragged without result. As nothing was to be gained from the prisoner, he was allowed to live at Mexico in an honorable captivity. When Cortes began in 1524 his expedition for the conquest of Honduras, he took Guatemozin with him; and he was thus a witness of the misfortunes that attended this march of his conquerors. Late in the campaign two Spanish nobles accused him and his Mexican companions of having formed a plot to assassinate the Spanish chiefs, Cortes among the rest. The latter ordered them to be at once brought before him, and after a brief inquiry into the accusation, which was not sustained by proof, he commanded their execution. According to Prescott they were hanged on a large *ceiba* tree standing by the roadside; according to other authorities, they were executed with considerable ceremony in the public square of Teotilac. The widow of Guatemozin was thrice married after his death, in each case to a Spaniard.

GUATUSOS, a tribe of Indians, living on the banks and head waters of the Rio Frio, which flows into Lake Nicaragua at its S. extremity. The country of these Indians, who are popularly supposed to have comparatively fair complexions and red hair, has never been penetrated. The attempts made by the Catholic missionaries and the governors of Nicaragua to reach them, though often renewed, have always been repulsed. A body of men under the commander of the fort of San Carlos endeavored to enter their country in 1849, but they were driven back. There are some reasons for believing that they are of the same Aztec family which occupied the western shores of Lake Nicaragua, and that they still preserve their original language and habits.

GUAVA (Span. *guayaba*), a name for trees of the genus *psidium*, belonging to the myrtle family. There are about 100 species of the genus, which grow in tropical and sub-tropical America, though the number that bear edible fruit is small. The one best known as the guava is *P. guaiava*, of which there are several cultivated forms, differing in the size, shape, and quality of their fruit. It is a small tree, from 9 to 15 ft., seldom over 20 ft. high, with angular branches, and an abundance of elliptical pointed leaves, which are covered below with a velvety down. The flowers are solitary

or three together in the axils of the upper leaves, about an inch in diameter, white, and with an agreeable odor; the fruit, usually about an inch in diameter, varies in size and shape; the principal cultivated varieties are called *maliforme*, apple-shaped, and *pyriforme*, pear-shaped, from



Guava (*Psidium Cattleianum*).

the form of the fruit. Guavas are bright yellow, exceedingly fragrant, and filled with a yellowish or reddish seedy pulp, which has an acid-sweet flavor, but is rather disappointing to the taste after the sense of smell has been gratified by its odor. The guava grows abundantly in the West Indies, has been acclimated in Algeria and other warm countries, and is cultivated under glass for its ornamental foliage and flowers as well as for its fruit. Cattle's or the purple guava, *P. Cattleianum*, though brought to Europe from China, is probably a native of South America; it is much more hardy than the common guava, and though its claret-colored fruits, with a pitted rind, are smaller and more acid, it produces them in greater abundance. The wood of the guavas is close-grained, but their principal value is in their fruit, which is consumed in the fresh state, and large quantities are made into jelly.

GUAXACA. See OAJACA.

GUAYANA. See GUIANA, and VENEZUELA.

GUAYAPE, a river of Honduras, an affluent of the Patuca, in the department of Olancho.

This river has been celebrated from the earliest period for its rich gold washings, which are worked by the natives in a rude manner. All the streams in Olancho carry gold in their sands, but none have an equal celebrity in this respect with the Guayape.

GUAYAQUIL, a maritime city of the republic of Ecuador, capital of the province of Guayas, 150 m. S. W. of Quito; pop. about 26,000. It is built on the W. bank of the bay of Guayaquil, on which it has a front of a mile and a half, and is traversed by four creeks, crossed by three wooden bridges, two of which separate the old town from the new or more modern portion. Many of the streets are tortuous, but a few are regular, cutting each other at right angles, and all are lighted with gas; most of the houses are of wood, roofed with tiles, and rarely of more than two stories. Portals or covered arcades surround every block or square of houses. The principal public buildings are the cathedral and six other churches, the governor's palace, city hall, prison, two hospitals, and barracks. There are two colleges, a naval and a number of common schools, and a new school for females commenced in 1872. An association for mutual instruction was organized in the same year. The town has an orphan asylum and several other benevolent institutions. The port, formed by the river and its estuary, is very commodious, presents good anchorage for vessels of any draught, and is monthly visited by an average of 17 steamers. In 1870, 125 vessels of all kinds and flags were entered, the aggregate tonnage being 55,310. A large number



Cathedral of Guayaquil.

of ships were formerly built here. There are several factories employing steam power, including one for artificial ice and a foundry. Provisions are brought each morning in canoes, which literally throng the river, and give it the appearance of another town. The heat is

excessive; epidemics are of frequent occurrence; and during the rainy season, from December to May, noxious insects and reptiles infest the city and surrounding country. Many and important improvements were commenced in 1872, mostly of a hygienic nature. Two lighthouses were built in 1873, one on the island of Santa Clara and the other on the island of Puná. Three forts defend the town. Guayaquil is the chief commercial centre of Ecuador; the principal articles of export are cacao, cotton, coffee, tobacco, nuts, fruits, jipijapa (or Panama) hats, sarsaparilla, India rubber, and pearl shells. In 1872 there were shipped 181,973 quintals of cacao (the total crop of which was 187,238 quintals), 75,000 of India rubber, 58,451 of pearl shell, 22,531 of vegetable ivory, 6,600 of coffee, and 39,728 lbs. of sarsaparilla. The value of the exports to Great Britain in 1868 was \$510,505; in 1869, \$1,320,000; in 1870, \$692,055; in 1871 \$1,388,830; in 1872, \$1,219,200; total in five years, \$5,130,590. The imports from Great Britain during the same period amounted to \$1,422,045. A new road from Guayaquil to Quito is in rapid progress (1874), and a railway has been commenced over a part of the same route. A quicksilver mine and coal mines have been discovered near the city.—Guayaquil was conquered by Sebastian Belacazar in 1535. Of the numerous fires which have occurred since 1624, that of 1764 was the most destructive, the place having been almost entirely abandoned for a time. In 1770 a royal order was issued for its restoration.

GUAYAQUIL, a river of Ecuador, flowing wholly within the province of Guayas, and giving its name to the preceding city. It is formed by the union of a great number of small streams which rise among the Andes; enters the Pacific through the gulf of Guayaquil in lat. 2° 27' S.; is navigable about 110 m. to Caracol; and in the upper part of its course is known successively as the Caracol and Babahoyo. It is subject to overflow, and is encumbered by a bar 12 m. from its mouth, and by shifting sands.

GUAYAS, a maritime province of Ecuador, bordering on the Pacific and Peru, and on the provinces of Manabí, Asuay, Los Rios, and Loja; pop. about 37,000. It is drained by four or five rivers, of which only the Guayaquil is navigable to any considerable distance from the sea. The soil is extremely fertile; rice, cacao, cotton, tobacco, and tropical fruits are largely produced. The northern portions are marshy; in the southwest are vast forests affording the finest species of American precious woods and excellent building timber. The climate is excessively hot, and rain falls almost incessantly from December to May. Fevers prevail.

GUAYMAS, a town of Mexico, in the state of Sonora, on Yaqui bay, gulf of California, in lat. 28° N., lon. 110° 50' W.; pop. about 3,000. It is surrounded by hills, and is hot and unhealthy. Most of the streets are narrow and dirty, and there are no buildings worthy of note. The

port is commodious, has excellent anchorage, and is frequented by many vessels. Its foreign trade is large, as it is the port of entry for the states of Sonora and Chihuahua. The chief exports are wheat, flour, and hides. The Indians carry on a profitable fishery in the bay.

GUBBIO (anc. *Iguvium* or *Eugubium*), a town of Italy, in the province of Perugia, near Mount Calvo, 30 m. N. E. of the city of Perugia, and 110 m. N. of Rome; pop. about 6,000. It contains a cathedral, several churches, about 20 convents, and a theatre; and silk and woollens are manufactured. During the middle ages it had a population of 30,000, and was the seat of a fine school of painting. It is supplied with water from a reservoir formed by a dam across the valley between Mounts Ingino and Calvo, which is one of the most remarkable specimens of mediæval engineering. There is a museum containing many Pelasgic remains. The famous Eugubian tablets, with inscriptions in the Umbrian, Etruscan, and Latin languages, which have been variously interpreted by antiquaries, were discovered in 1444 about 8 m. from the town. In the 14th century Gubbio became a part of the Papal States, with which it passed to the kingdom of Italy. The ancient Iguvium was considered by the Romans to be of great strategical importance, and was prominent in the early part of the civil war between Cæsar and Pompey.

GUBEN, a town of Prussia, in the province of Brandenburg, at the junction of the Neisse and the Lubst, 25 m. S. by E. of Frankfort-on-the-Oder; pop. in 1871, 21,423. It contains several churches and a gymnasium; has extensive manufactories of cloth and tobacco, and an active trade, especially in red wines, produced on the adjoining Neisse hills. The Hussites devastated the place in 1434 and 1437, and the Swedes occupied it in 1631 and 1642.

GUBITZ, *Friedrich Wilhelm*, a German author, born in Leipsic, Feb. 27, 1786, died June 5, 1870. He studied theology, worked as a type founder, printer, and engraver, became professor of wood engraving at the Berlin academy of fine arts in 1805, and afterward engaged also in bookselling. His principal works are *Gedichte* (2 vols., Berlin, 1859), *Wirklichkeit und Phantasie* (4 vols., 1862), and *Erlebnisse* (3 vols., 1868-'9). His most popular play is *Der Kaiser und die Müllerin*. As a theatrical critic and the founder of several periodicals devoted to dramatic literature, he contributed much to the improvement of the stage. His *Deutscher Volkskalender*, which he edited for many years, became exceedingly popular, and found numerous imitations.

GUDGEON, a cyprinoid fish of the genus *gobio* (Cuv.), found chiefly in the fresh-water streams and lakes of central and temperate Europe. It is characterized by a lengthened, rounded body, with short dorsal and anal fins without serrated rays; a labial barbel at each corner of the mouth; pharyngeal teeth, conical, slightly curved at the tip, and in two rows; and a

wide, flattened head, with an obtuse snout, and the lower jaw the shorter; the swimming bladder is large and double. The common gudgeon (*G. fluviatilis*, Cuv.) is 7 or 8 in. long, greenish brown above and on the sides, white below, the pectorals, ventrals, and anal grayish white tinged with brown, and the dorsal and caudal pale brown, with darker spots. It occurs in shoals in the gravelly waters of Europe. The food consists of worms, aquatic insects and larvae, small mollusks, ova, and fry; the eggs are



Gudgeon (*Gobio fluviatilis*).

laid between April and August, and the young grow to a length of about 5 in. the first year. It is much esteemed for its delicate flavor, and affords good sport to the angler; it will bite at all times of day, but best in the morning and evening, and in cloudy weather; the line must be very fine, and the hook kept within an inch of the bottom; the best bait is the common red dunghill worm. Five other species are described in Europe and Asia, and one from the Niagara river (*G. cataractæ*, Val.), about 5 in. long; the color of this above is gray, plumbeous on the sides, silvery white below, and the fins gray.

GUDIN, Jean Antoine Théodore, a French painter, born in Paris, Aug. 15, 1802. He was a pupil of Girodet-Trioson, and from the outset of his career devoted himself mainly to sea pieces. Among his best productions are a view of "Mont St. Michel at High Tide;" "A Steamboat landing Passengers at Dover;" "A Gale, Jan. 7, 1831, in Algiers Harbor;" "La Salle discovering Louisiana;" "A Naval Battle in the Chesapeake;" and "A Shipwreck on the Coast of America."

GUEBRES, or **Guebers** (Turkish, *Ghiaux*, *Ghauurs*, and *Giaours*, infidels), a name applied to those Persians who adhered to the ancient religion of Zoroaster after the great majority of the nation had been converted to Mohammedanism, and who are generally known by Europeans as fire worshippers. They call themselves *Beh-Din*, "those of excellent belief." The Arabs completed the conquest of Persia in the 7th century, and the great mass of the nation adopted the faith of the conquerors. Those who refused to do so were subjected to persecution. Some of them took refuge in the wilderness of Khorasan, and others in Kohistan. The latter in the 9th century emigrated to In-

dia and settled in the neighborhood of Surat. Their descendants still inhabit the same region, and are called Parsees. (See PARSEES.) The descendants of those who remained in Persia have gradually decreased in numbers and sunk into ignorance and poverty, though still pre-



Guebre Priests.

serving a reputation for honesty, chastity, industry, and obedience to law, superior to that of the other Persians. They are estimated to number about 7,000. They reside chiefly in Yezd and the surrounding villages, but are found here and there over the whole of Persia. A celebrated temple of the Guebres is situated near the Russian town of Baku, on the Caspian sea. (See BAKU.) For an account of their religion, see ZENDAVESTA, and ZOROASTER.

GUEBWILLER. See GEBWEILER.

GUELDERLAND. See GELDERLAND.

GUELDER ROSE, the name of a garden form of *viburnum opulus*, a shrub which in its wild state is common in the cooler parts of America, Europe, and Asia. It grows with an upright habit from 2 to 10 ft. high, has opposite three-lobed leaves, and each branch terminated by a broad cluster (cyme) of white flowers, the majority of which are small and perfect, while those upon the margin of the cluster have corollas many times larger than the others, and showy, but, having neither stamens nor pistil, are sterile; the perfect flowers are succeeded by a berry-like spherical fruit having one flat smooth stone; it is bright red, very acid, and is sometimes cooked with sugar under the name of high or bush cranberry. The wild shrub is worth cultivating, as its flowers are pleasing, its bright fruit showy, and its leaves in autumn turn to a dark crimson. In the guelder rose all the flowers of the cluster are like the marginal ones of the wild plant, and the cymes become spheri-

cal masses of crowded white petals, which have given to it the popular name, and the one most used in this country, of snowball, and with the French of *boule de neige*. The garden form is supposed to have originated in Gelderland, but it has been so long in culti-



Guelder Rose (*Viburnum opulus*).

vation that its history is obscure. A form with variegated foliage is cultivated, and there has recently been introduced a variety with very large flower clusters as *V. macrocephalum*. The Japanese *viburnum plicatum* has finer foliage and flowers than the common plant. All are of the easiest culture.

GUELPH, a town and inland port of entry, capital of Wellington co., Ontario, Canada, 45 m. W. S. W. of Toronto; pop. in 1871, 6,878. It is built upon several hills, on the river Speed, and on the Grand Trunk railway, at the terminus of the Wellington, Grey, and Bruce line, and the Galt and Guelph branch of the Great Western railway. The court house and several other buildings are of limestone quarried in the vicinity. The surrounding country is a rich agricultural region, and wheat and flour are shipped in considerable quantities. The river here falls about 30 ft., furnishing abundant water power. There are several flour mills, saw mills, planing mills, breweries, and manufactories of woollens, iron castings, machinery, agricultural implements, leather, sewing machines, musical instruments, wooden ware, &c. There are three branch banks, a library and reading room, two daily and three weekly newspapers, and churches of seven denominations.

GUELPHS AND Ghibellines (Ger. *Welfen*, Ital. *Guelph*, and Ger. *Wiblingen* or *Waiblingen*, an estate belonging to the Hohenstaufen family, in the modern Württemberg), the names of two celebrated factions in Italy and Germany during the middle ages. Guelph or Welf is a baptismal name in several German families, but more particularly known in the his-

tory of a line of princes originally Italian, and traced to the 9th century. They emigrated to Germany two centuries later, and became divided into two branches, both possessing large estates in southern Germany, between the Brenner and St. Gothard. The present royal family of England and the ducal line of Brunswick in Germany trace their descent to a Guelphic princess, Kunigunde, the heiress of one of the branches, who became the wife of Alberto Azzo II., prince of Este, born in 996. By this marriage the estates of the Guelphs were united to those of the Este princes in Lombardy. The son of Kunigunde, Guelph IV., duke of Bavaria, inherited also the estates of the senior branch of the Guelphs, called the Guelphs of Altorf, and became thus the founder, as it were, of the reunited Guelphs. The emperor Henry IV. bestowed upon him the duchy of Bavaria, but soon incurred his enmity by restoring a part of the Bavarian possessions to their rightful duke, Otho II. Guelph took up arms against the emperor, and, in league with other discontented princes, defeated him in several battles. They were afterward reconciled, and Guelph joined in the first crusade and was present at the taking of Jerusalem. He died in Cyprus in 1101, on his return. Guelph II., his son, at first supported the emperor Henry IV., but soon deserted him and embraced the cause of his rebellious son Henry V., of whom he became a great favorite. He died in 1120, without children; and the duchy of Bavaria was inherited by his brother, Henry the Black, who transmitted it to his son, Henry the Haughty, in 1126. The latter married the daughter of the emperor Lothaire, and received from his father-in-law the duchy of Saxony. He subsequently disputed the crown of Germany with Conrad III., was deprived of most of his possessions, and was put under the ban of the empire (1139). His brother, Count Guelph of Altorf, guardian of the famous Henry the Lion, his nephew, the son of Henry the Haughty, at that time but ten years of age, endeavored to recover for his ward possession of the confiscated duchies. Bavaria had been bestowed upon Leopold of Austria; Saxony upon Albert the Bear, of Brandenburg. The Saxons demanded a Guelphic prince; and Albert, at the emperor's desire, formally resigned the duchy to the youthful heir. In Bavaria Count Guelph was less successful. He was put under the ban of the empire as a rebel in 1140, but ventured nevertheless to give battle to Conrad's troops, near Weinsberg, and was defeated. In this action were first heard those famous battle cries, which afterward became the most noted in Europe: "Strike for the Guelphs;" "Strike for the Ghibellines." The wars of the Guelphs and Ghibellines, originating thus, soon became of much wider political consequence. In Germany they were of no great duration, but they long raged in Italy. Throughout the peninsula the family of the Guelphs found partisans weary of the yoke of

the German emperors. The pope, irritated by German opposition in the matter of the investitures, declared for the Guelphs. The Lombard cities formed their league in favor of the Guelphic princes, while a similar league, under the patronage especially of Pavia, declared for the Hohenstaufen, by this time better known as the Ghibellines. The latter prevailed for many years. The emperor Frederick Barba-rossa, notwithstanding the efforts of Pope Alexander III., took Milan, and reduced the whole of Lombardy. The contest was resumed under Frederick II. His grandson Conradin was the last of the race of Hohenstaufen. The Ghibellines had rallied about this unfortunate prince, who, at the age of 16, was beheaded at Naples by order of his perfidious enemy, Charles of Anjou (1268). The Guelphs meanwhile had been driven from both of their German duchies. The grandson of Henry the Lion, Otho the Child, had done homage to Frederick II. in 1235. He had been thereafter created by this emperor duke of Brunswick, and held some remnant of his ancestors' estates as fiefs of the empire. From him were descended the reigning houses of England, Hanover, and Brunswick. Twenty years later the contest became but a private feud of various Italian factions; of families sometimes in the same city. In 1259 the marquis of Este, a Guelph, triumphed over a Ghibelline faction of Verona, headed by Ezzelino the Ferocious. (See EZZELINO.) At Milan, in 1277, the Torriani, Guelphic chiefs, were compelled to surrender power to the Visconti, representing the Ghibellines. At Florence, in 1258, Silvestro de' Medici, of a Guelphic faction known then as the blacks (*neri*), against the whites (*bianchi*), by which name the Ghibellines had come to be designated, deprived the family of the Uberti of their power, and gave to the Florentines a republican government. Pisa, after a disastrous war with Genoa, fell under the domination of the Guelphs about 1284, but only for a time. Rome, in the time of Rienzi (middle of the 14th century), for years vacillated between oligarchy and democracy, Ghibellines and Guelphs, as those factions were now designated. In general the former were partisans of imperial and feudal hierarchy; the latter of the church and national independence. Their contests, after desolating Italy for 400 years, yielded to self-exhaustion. The French invasion of 1494 was mainly instrumental, however, in diverting the national mind, and interrupting a party spirit unsurpassed in the histories of obstinate and cruel domestic wars.—In 1815, shortly after Hanover was erected into a kingdom, the prince regent, afterward George IV. of Great Britain, in honor of the Guelphic founders of the house of Brunswick-Hanover, established an order of knighthood, known as the Guelphic order of Hanover. The insignia are a cross of gold, bearing a medallion, on the red field of which is a silver horse upon a green mound (sinople); the motto is: *Nec aspera terrent*.

GUENON. See MONKEY.

GUERARD. See LEOPARD.

GUÉRANDE, a town of France, in the department of Loire-Inférieure, 38 m. N. W. of Nantes; pop. in 1866, 6,749. It is now 3 m. from the sea, but it once had a harbor and was a place of importance. It is surrounded by massive walls flanked with imposing towers, and has four gates. In the environs are extensive salt marshes, which are below the level of the sea and are protected by dikes, through which the water is admitted at high tide into basins and evaporated. The annual production of salt is over 80,000 tons. Guérande has also manufactories of cotton and linen goods, herring fisheries, and a brisk trade in wine. It was founded in the 6th century, and was fortified in 1481.

GUERAZZI. See GUERRAZZI.

GUERCINO (GIOVANNI FRANCESCO BARBIERI), an Italian painter, born at Cento, near Ferrara, in 1590, died in Bologna in 1666. An accident deprived him in infancy of the use of his right eye, whence he gained his name Guercino (little squint-eye). While a boy he manifested a remarkable talent for painting, and according to common report became a disciple of the Carracci at Bologna, although Cremonini and Benedetti Gennari, artists of little note, seem to have been the masters from whom he acquired chiefly the rudiments of the art. Writers have distinguished three different styles in Guercino's paintings, of the first of which few specimens are to be found, being the least known, while the second and third embrace the greater portion of his works. His earlier pictures show the influence of Caravaggio; but by intercourse with prominent artists of other schools he formed what is known as his second style. In this style are painted his "St. Petronilla," formerly in St. Peter's; the "Aurora," at the villa Ludovisi; "St. Philip of Neri," at Rome; the "Resurrection," at Cento; "St. Helena," at Venice; and above all his frescoes on the dome of the cathedral at Piacenza. His third style, a palpable imitation of Guido, is feeble and languid. He was exceedingly industrious, and among his works are enumerated 106 altarpieces, 144 large compositions, and an immense number of Madonnas, portraits, and landscapes. He also left numerous drawings. He founded a school, which flourished for a number of years at Cento.

GUÉRET, a town of France, capital of the department of Creuse, near the left bank of the Creuse, 35 m. N. E. of Limoges; pop. in 1866, 5,126. It has a communal college, normal school, public library, and museum; manufactories of combs, bone black, buttons, and potash; distilleries and tanneries; and a brisk trade in coal, lumber, butter, and fruits. Guéret was built around an abbey founded about 720.

GUERICKE, Heinrich Ernst Ferdinand, a German theologian, born at Wettin, Prussia, Feb. 23, 1803. He graduated at the university of Halle, and was appointed professor there in

1829. He was an opponent of the union between the Protestant churches in Prussia, and was dismissed from the university in 1835, but resumed his academical functions in 1840. He afterward edited the *Zeitschrift für lutherische Theologie*, in concert with Rudelbach. His principal works are: *Historisch-kritische Einleitung in das Neue Testament* (1843), the second part of which appeared in Leipsic in 1854 under the title of *Gesamtgeschichte des Neuen Testaments, oder Neutestamentliche Isagogik* (3d ed., 1868); *Allgemeine christliche Symbolik* (3d ed., 1861); *Lehrbuch der christlichen Archäologie* (1847; 2d ed., 1859); and *Handbuch der Kirchengeschichte* (9th ed., 3 vols., 1867). The last named work has been translated by Prof. Shedd (Andover, 1857).

GUERICKE, Otto von, a German natural philosopher, born in Magdeburg, Nov. 20, 1602, died in Hamburg, May 11, 1686. He was for 35 years burgo-master of Magdeburg. In 1650 he invented the air pump, subsequently perfected by Robert Boyle and others. He illustrated the force of atmospheric pressure by fitting together two hollow brass hemispheres, which, after the air within them had been exhausted, could not be pulled apart. He also invented a species of barometer. As an astronomer he was one of the first to express the opinion that the return of comets might be calculated. He published several treatises in natural philosophy, of which *Experimenta Nova, ut vocant Magdeburgica*, &c. (Amsterdam, 1672), contains his experiments on a vacuum.

GUÉRIN, Jean Baptiste Paulin, a French painter, born in Toulon, March 25, 1783, died in Paris, Jan. 16, 1855. He was the son of a locksmith, and at first made a living as a workman. Having saved enough money to go to Paris, he accepted a menial office in the studio of Gérard, where he secretly executed a large picture, "Cain after the Death of Abel," which was purchased by the government. Among his paintings, some of which are mythological, while most of them are of a religious character, are the "Descent from the Cross," which was presented to the Roman Catholic cathedral in Baltimore, U. S., by Louis XVIII.; "Anchises and Venus," purchased by the French government in 1822; and "Adam and Eve expelled from the Garden of Eden," one of the masterpieces of the French school. He left also many portraits, those of Charles X. and Lamennais among the number.

GUÉRIN-MÉNEVILLE, Félix Édouard, a French naturalist, born in Toulon, Oct. 12, 1799, died in Paris early in 1874. He studied under Cuvier, and became in 1850 professor of entomology at the collège de France, and subsequently was inspector general of silk culture. His works include *Iconographie du Règne animal de M. le baron Cuvier* (7 vols., 1830-'44); *Magasin de zoologie, d'anatomie comparée et de paléontologie* (26 vols., 1831-'44); and *Genera des insectes* (6 vols., 1835). A. Percheron was associated with him in the last named publica-

tion, and Eugène Robert in the *Guide de l'élève des vers à soie* (1856).

GUERNSEY, the westernmost of the Channel islands, belonging to Great Britain, and lying in the English channel, 28 m. from the N. W. coast of France, and 65 m. from England, between lat. 49° 24' and 49° 33' N., and lon. 2° 30' and 2° 40' W.; area, 25 sq. m.; pop. in 1871, 30,593. The surface toward the north is low and level, but toward the south is hilly. The coast is deeply indented with excellent harbors, and in some places rises into precipitous cliffs 270 ft. high. The climate, though variable, is temperate and healthy. The soil is fertile, but agriculture is generally in a backward state. The principal productions are wheat, barley, oats, rye, potatoes, fruit, cider, wine, butter, pigs, and cattle. The most important exports are apples, cider, wine, potatoes, and granite. The inhabitants are a simple and thrifty race, and speak a dialect of that Norman French which has been obsolete for centuries save in these islands. The military government is vested in a lieutenant governor, who represents the sovereign in the assembly of the states. The legislative body, called the states, is composed of 32 members, two of whom are appointed by the crown. The states vote the ordinary expenses, but new taxes must be sanctioned by the crown. Victor Hugo resides in this island. Capital, St. Peter Port, or Peter-le-port.

GUERNSEY, an E. county of Ohio, drained by branches of Muskingum river; area, 460 sq. m.; pop. in 1870, 23,838. It has a hilly surface, with a soil of moderate fertility, and abounding in coal. The slopes afford good pasturage, and in many places are covered with vineyards from which wine is produced. It is traversed by the central Ohio division of the Baltimore and Ohio railroad. The chief productions in 1870 were 175,051 bushels of wheat, 685,758 of Indian corn, 325,676 of oats, 81,885 of potatoes, 696,183 lbs. of butter, 617,551 of wool, 474,178 of tobacco, and 31,376 tons of hay. There were 7,047 horses, 6,411 milch cows, 8,673 other cattle, 151,848 sheep, and 15,222 swine; 13 manufactories of carriages and wagons, 10 of saddlery and harness, 2 of salt, 2 of sashes, doors, and blinds, 6 of tin, copper, and sheet-iron ware, 2 of woollen goods, 6 flour mills, 6 saw mills, 7 tanneries, and 5 currying establishments. Capital, Cambridge.

GUÉROULT, Adolphe, a French journalist, born at Radepond, Jan. 29, 1810, died in Paris, July 22, 1872. He was the son of a wealthy manufacturer, and early devoted himself to literary pursuits and to the advocacy of St. Simonism. He was the correspondent of the *Journal des Débats* in Spain and in Italy for many years. In 1842-'7 he was consul at Mazatlan, and in 1847-'8 at Jassy; and in 1852 he became sub-chief of the *crédit foncier*. As a member of the corps législatif (1863-'9) and as the editor-in-chief of the *Opinion nationale*, which he founded in 1859, he exerted great influence

in behalf of the so-called imperialistic democracy, and as a strenuous opponent of ultramontaniam. With other deputies he was denounced in 1869 by M. de Kervéguen for his alleged friendly attitude toward Prussia, but was vindicated by the assembly. Among his publications is *Discours prononcés au corps législatif* (Paris, 1869).

GUERRAZZI, Francesco Domenico, an Italian author and politician, born in Leghorn in 1805, died in Rome, Sept. 23, 1873. He was educated as a lawyer, and at the age of 22 brought himself into notice by writing *La battaglia di Benevento*, a historical romance (Florence, 1828). Being an ardent republican, he took part in a conspiracy, and in 1831 was thrown into prison, where he wrote *L'Assedio di Firenze* and *Isabella Orsini* (the latter translated into English by Luigi Monti, New York, 1859). Upon his discharge he removed to Florence, where he became a successful lawyer. Among his publications while there were *Veronica Cybo*, *Serpicina*, and *I Nuovi Tartuffi*, and a drama, *I Bianchi ed i Neri*. He took a leading part in the revolution of 1848, and was imprisoned for a short time. He had no sooner recovered his liberty than he placed himself in relation with Mazzini, Gioberti, and other agitators, founded a republican journal at Florence, was chosen a deputy to the national assembly of Tuscany, and appointed minister of the interior in October, 1848. After the departure of the grand duke from his capital in February, 1849, Guerrazzi became a member, and in March the chief of the provisional government, which was overthrown in the following month. He was arrested April 14, and removed in June to the state prison of Volterra, where he was detained till July, 1853, and wrote a defence of his political course, *Apologia della vita politica di F. D. Guerrazzi* (Florence, 1851). After trial he was sentenced to perpetual banishment, and proceeded to Marseilles. Not being permitted to reside there, he went to Bastia in Corsica, where he wrote *Beatrice Cenci* (Pisa, 1854; English translations by Monti and Mrs. Watts Sherman, New York, 1858). His next place of residence was in Piedmont, where he published *L'Asino*, a satirical journal. As member of the parliament which assembled at Turin, and afterward of the Italian parliament, he belonged to the extreme left. He also published *Pasquale Paoli* (2 vols., Milan, 1865).

GUERRERO. I. A state of Mexico, bounded N. by the states of Michoacan, Mexico, and Puebla, E. by Oajaca, S. by the Pacific, and W. by Michoacan; area, 24,226 sq. m.; pop. in 1869, 241,860, mostly Indians. This state, formed in 1849 of three districts from Mexico, two from Puebla, and one from Michoacan, is one of the most picturesque in the republic. It has a very irregular surface, being traversed from E. to W. by the Cordillera of the Sierra Madre, which throws off numerous spurs, many extending almost to the coast, especially in the

western half, where also the greatest altitude is attained, and some trending N. until they are lost in Michoacan, or confounded with the gradual descending slope of the Mexican plateau. There are few valleys, and these of inconsiderable extent. The chief river is the Rio de las Balsas, which rises in Tlascala, enters the state near the N. E. corner, and flows first W. and then S. W., and falls into the Pacific by two mouths, half way between Acapulco and Manzanillo, forming the whole dividing line with the state of Michoacan. It is not navigable except by small craft. Silver is the most important mineral, but of the numerous mines formerly in operation, only 13 are now worked, partly owing to the inferior quality of the metal in the others, and partly to the want of capital. Attention has within a few years been called to important gold mines at San José and Piedras Blancas. Cinnabar is abundant elsewhere, as are likewise lead, sulphur, saltpetre, and copperas; and anthracite is found in Chilpancingo. The climate varies from cold to extremely hot, according to elevation. Intermittent and other fevers prevail in most localities; goitre along the banks of the Balsas, and in the vicinity of the capital a species of leprosy. The soil is very fertile, and vegetation, particularly arboreal, is rich and varied, and there are extensive virgin forests, presenting excellent timber and many species of precious woods. Maize and beans are the chief agricultural productions, the former yielding three large crops annually; cotton, the sugar cane, coffee, cacao, yuca, and tobacco are also cultivated; and cochineal and indigo are extensively produced. Agriculture is, however, little attended to save in the central portions of the state. The chief articles of export are cochineal, indigo, cacao, wool, and hides; the imports consist of cotton and silk fabrics, spices, and hardware. The foreign trade, once very important, is carried on through the port of Acapulco. Manufactures are limited to coarse cotton and woollen stuffs, rude agricultural implements, and household utensils. Many of the inhabitants are miners; and on the coast numbers are engaged in pearl fishing. **II.** A city, capital of the state, formerly called Tixtla or Tixtlan, in a narrow gorge between two mountains in the Sierra Madre, 152 m. S. by W. of Mexico; pop. in 1869, 6,501. Raised to the rank of a city upon the formation of the state in 1849, this place is as yet of little importance in any respect. The chief occupations of the people are coarse manufactures, mining, and agriculture. Notwithstanding its elevation, 5,000 ft. above the sea, its climate is hot; intermittent fevers and goitre are common, and a species of leprosy called *pinto* prevails to an alarming extent among the lower classes.

GUERRERO, Vicente, president of Mexico, born at Tixtla about 1770, executed at Caillapa, Feb. 14, 1831. He was a mulatto, and origi-

nally a slave. In the struggle for the independence of Mexico he exhibited great courage, and after the death of Mina became one of the leaders of the insurgents. In 1820 he entered the service of Iturbide, upon whose overthrow in 1823 he gave in his adherence to the provisional government and to the republic. In 1827 he was a candidate for the presidency, but was defeated by Pedraza by a majority of two votes in the electoral college. The partisans of Guerrero alleged that the election was carried by fraud, and rose in insurrection. Pedraza resigned in 1829, and Guerrero took possession of the presidency. On Sept. 15 of that year he issued a proclamation abolishing slavery. The next year, a Spanish force having invaded Mexico, dictatorial power was conferred upon Guerrero, and his troops under Santa Anna defeated the Spaniards; but thereupon Bustamente and Santa Anna, on pretence that he ought not to have prolonged his dictatorship after the defeat of the Spaniards, revolted against Guerrero, who was deserted by his troops and compelled to take refuge in his hacienda at Tixtla. He was popular, and the people rallied to his support. He renewed the contest, but it was brought to a sudden close through the agency of a Genoese ship captain, who invited him to a dinner on board his vessel at Acapulco, and betrayed him to his enemies. He was tried by a military commission and shot.

GUESCLIN. See DU GUESCLIN.

GUESS, George, or Sequoyah, a half-breed Cherokee Indian, inventor of the Cherokee alphabet, born about 1770, died in San Fernando, northern Mexico, in August, 1843. He cultivated a small farm in the Cherokee country of Georgia, and was occupied as a silversmith when in 1826 he invented a syllabic alphabet of the Cherokee language, which consisted of 85 characters, each representing a single sound in the language. This is probably the most perfect alphabet ever devised for any language. For the characters he used, as far as they went, those which he found in an English spelling book, although he knew no language except his own. A newspaper called the "Phoenix" was established, a part of it printed in Cherokee, using the alphabet of Guess. A part of the New Testament was also printed in this character. He was not a Christian, and is said to have regretted his invention when he found it used for this purpose. He accompanied his tribe in their migration beyond the Mississippi, and resided for some time in Brainerd. In 1842 he went with other Indians into Mexico, where he was attacked by a fatal sickness.

GUETTÉE, Wladimir, a French historian, born in Blois about 1815. He took orders, and was for several years a parish priest. After the revolution of 1848 he edited at Blois a journal entitled *La Démocratie*. Subsequently he went to Paris, where he became chaplain in several hospitals, but was removed on account of his Jansenist opinions. He contributed largely to

the *Observateur Catholique*, the leading organ of the Gallican church. His principal works are: *Histoire de l'Église de France* (12 vols., 1847-'57); *Jansénisme et jésuitisme* (1857); *Histoire des jésuites* (4 vols. 8vo, 1858-'72); *Papauté temporelle condamnée par le pape St. Grégoire le Grand* (1861); *Réfutation de la prétendue Vie de Jésus de M. Renan* (1864); *De l'Encyclique du 8 décembre, 1864* (1865); and *Exposition de la doctrine de l'Église orthodoxe et des autres Églises chrétiennes* (1868).

GUGGENBUHL, Louis, a Swiss philanthropist, born in Zürich in 1816, died Feb. 2, 1863. He took his medical degree in 1836, and then spent three years in the study of cretinism at Seruf in the canton of Glarus. In 1842 he opened a retreat for cretins at Abendberg, above Interlaken. At first he encountered some opposition from the government in consequence of having substituted Protestants for the sisters of mercy who had been originally employed, but afterward had great success, and showed that the condition of many of the cretins is susceptible of improvement. The institution established by him was abandoned after his death. He published a treatise (Basel, 1851) and various pamphlets on cretinism.

GUIANA, Guyana, or Guayana. 1. An extensive territory on the N. E. coast of South America, comprising three distinct colonies, viz.: British, Dutch, and French Guiana. It lies between lat. 0° 55' and 8° 40' N., and lon. 51° 30' and 61° W., and is bounded N. by the Atlantic, E. and S. by Brazil, from which it is separated by the Oyapok river and the Tumucuraque and Acaray mountains, and W. by Brazil and the Venezuelan province of Guayana; area estimated at 195,000 sq. m.; pop. about 280,000. The coast line is about 740 m. long. The shore is skirted with mud banks, the water on which gradually decreases in depth toward the beach; which circumstance, added to the absence of landmarks, and the existence of rocks, bars of mud, and quicksands at the mouths of the rivers, renders the approach difficult for all craft, and impossible for vessels drawing more than 12 ft., these being obliged to moor 3 m. from shore. The level of the coast region, from lon. 54° to 61°, normally corresponding to that of the sea at high water, sinks at least one foot when the lands are drained and cultivated, so that the water can only be kept back by means of embankments and sluices. From lon. 54° eastward, the shore is not quite so low; but it is in some parts marshy, and is chiefly covered with mangrove forests. Beyond the flat country, which extends to a mean distance of 50 m. inland, except E. of lon. 54°, where it ends much nearer the sea, the surface gradually swells to an elevation of 200 ft., forming the northern edge of the table land of Guiana. This plateau, with a generally rising tendency, is intersected by parallel ranges of hills, much more numerous to the eastward, extending rib-like to the sierras of Tumucuraque and Acaray at the

extreme south, and limiting the basins of large rivers. The loftiest eminences, however, are in the west. Mt. Roraima, in the Socaraima range, forming for a distance of 18 m. part of the western limit of the country, is at once the highest in Guiana (7,500 ft.) and one of the most remarkable on the globe; it is a flat-topped solid mass, the upper portion of which presents a precipice 1,500 ft. high, glistening with the spray of numberless cascades which plunge down its sides. None of the other mountains attain a greater altitude than 4,000 ft. They are mostly of granite, and not a few isolated pyramidal or conical peaks shoot abruptly upward, and present with their denuded summits a striking contrast to the luxuriant vegetation at their base. The hills at the N. border of the table land are mostly of sandstone; and some of white quartz, with numerous particles of mica, glitter like gold. Throughout the whole flat country between the plateau and the sea a granite stratum underlies alluvial soil and clays, the last being covered with a black vegetable mould many feet deep, deposited by the rivers during their inundations. In the Essequibo is found a species of pure white clay.—The territory is drained by six large rivers. The Essequibo and the Berbice, in the western or British division, are both navigable by large vessels for 50 m. from the sea. The Corentyn separates the British from the Dutch possessions; and in the latter are the Saramaca and the Surinam, both of considerable magnitude. The Maroni forms the dividing line between Dutch and French Guiana. The Demerara, though comparatively small, is navigable for 100 m. up. All these rivers hold a generally northern course, through regions of great natural beauty, and receive the waters of numerous and extensive tributaries, especially the Essequibo, which has the Cuyuni and Masaruni (both little inferior to itself in magnitude), the Rupununi, Potaro, and others. The grand waterfall of Kaieteur is formed by the waters of the Potaro dashing in a single leap from the basin of that river into the valley of the Essequibo, a depth of 822 ft. The width of the river at the edge of the fall is 369 ft., and the depth of the water near the edge is 15 ft. in the dry season. Several smaller rivers fall into the Atlantic at various points. The climate, naturally hot in the low regions, is tempered by easterly breezes blowing steadily all the year round, the mean annual temperature being 80° F., and is much more salubrious than that of any of the West India islands, especially in the interior, where epidemics are almost unknown. In the rainy seasons, which embrace the months of December, January, February, June, July, and August, the rivers inundate the surrounding country, and intermittent fevers prevail. These seasons are ushered in by terrific thunderstorms, but hurricanes never occur. Slight shocks of earthquake are sometimes felt. The fertility of the soil is unsurpassed in South America, and ve-

getation is everywhere luxuriant. Fully one half of the territory is occupied by dense forests, whose majestic trees, supporting numberless convolvuli and other parasitic plants of endlessly varying hues, afford excellent timber prized for its hardness and durability, and inexhaustible quantities of fancy woods. The hard-wood species include varieties of *mimosa*s, such as the bully tree, often growing to a height of 100 ft., with a trunk 6 ft. in diameter, destitute of branches for the first 60 or 70 ft.; the greenheart (*nectandra Rodiei*), whose ash-colored bark is efficacious as a febrifuge; the crabwood (*carapa Guianensis*), sirwabali, sawari, purpleheart (*copaifera pubiflora*, and *C. bracteata*), and the mira tree (*mimosa excelsa*), attaining a height of 150 ft., whose wood is reputed as not inferior to teak. Chief among the precious woods is the mahogany, and among the palms the *areca oleracea* or cabbage palm. The *Bertholletia excelsa*, or Brazil-nut tree, constitutes in some parts whole forests; and almost all the intertropical fruit trees are found in abundance. Of woods and plants used for dyeing, there are several varieties; medicinal plants are common; and there are numerous fibrous plants furnishing a substitute for flax. The wild flowers are of indescribable splendor, including the gorgeous *Victoria regia*. One fourth of the country is devoted to plantations, where maize, cassava, yams, sweet potatoes, and arrowroot are cultivated to a considerable extent. The soil is well adapted to sugar, coffee, and cotton; and tobacco and indigo are likewise produced. The remaining fourth of the territory comprises meadow plains, affording excellent pasture to numerous herds of cattle and horses. The hilly regions are frequented by cougars and jaguars; the tapir is the largest quadruped; ant-eaters, armadillos, and agoutis are common; there are two or three varieties of deer; and the forests are inhabited by hosts of monkeys of many kinds. Vampire bats are numerous; the boa constrictor and anaconda or *tragavendos* abound along the banks of the rivers; and all the South American varieties of venomous snakes are here represented. There are several sorts of lizards, and the iguana is eaten as a delicacy by the natives. The marshy districts, and the flat country generally, after the rains have subsided, are infested by myriads of insects capable of inflicting troublesome if not dangerous wounds. The rivers swarm with alligators, sharks, and *peris* or *omas*, 2 ft. long, and armed with strong and formidable teeth; and they also afford excellent edible fish, such as the silurus, often measuring 12 ft. and weighing upward of 200 lbs. In most of the large rivers there are electric eels, turtles, and manatees or sea cows of gigantic size, but differing in most respects from the manatee of the West Indies. Among the birds are flamingoes, toucans, pelicans, spoonbills, peacocks, and Muscovy ducks; macaws, parrots, and other birds of brilliant plumage, including the humming

bird.—The population is made up of English, Dutch, French, and other Europeans, negroes and mulattoes, descended from the slaves formerly imported from Africa, and Indians, including the remnants of half a dozen tribes. The Warrows dwell in the vicinity of the plantations, where they sometimes work for wages; the Arrawaks inhabit the coast, and are skilled in boat building; but they are intemperate, improvident, and filthy. The other tribes live far from the European settlements; many of them are of a remarkably fair complexion. A few still practise cannibalism, but with these are not to be confounded the small number of Caribs to be met with in the same region, and who, like all the continental Caribs, have never been addicted to eating human flesh.—Guiana, discovered by Columbus in 1498, was visited by Vicente Pinzon two years later. Diego de Ordaz founded in 1531 the first town, St. Thomas; Dutch settlements were established about 1580; and in 1595 Sir Walter Raleigh landed in the country with the intention of exploring it in search of gold, a project which he did not execute till 1617. African slaves were first introduced in 1621. **II. British Guiana**, sometimes called DEMERARA, the largest of the three colonies comprised in the preceding territory, lies between lat. 0° 55' and 8° 40' N., and lon. 56° 20' and 61° W., and is bounded N. by the Atlantic, E. by Dutch Guiana, from which it is separated by the river Corentyn, S. by Brazil, and W. by Brazil and the Venezuelan prov-

ince of Guayana; area, 99,925 sq. m.; pop. in 1871, 193,491. In 1851 the population was about 130,000, and by the end of 1861 no fewer than 80,000 immigrants had been received, consisting of Europeans, free negroes, and East Indian and Chinese coolies. The census of that year gave 148,026 as the total population, 79,644 of whom were males. The immigration, though costly (agents having been sent to Calcutta and Canton to promote it), has been successful. (See COOLY.) The number of indentured laborers in June, 1866, was 32,124, and 3,069 not indentured, 8,739 of the whole being females. Some invest their money in the purchase of land, the price being fixed by law at \$10 per acre. Licenses for cutting timber, large quantities of which are exported, can be obtained for from 300 to 1,000 acres, at 1s. 3d. per acre. The country was formerly divided into the three counties of Essequibo, Demerara, and Berbice, but the two first are now united. The chief towns are Georgetown, at the mouth of the Demerara river, the capital of the colony, Demerara, and New Amsterdam or Berbice. The staple products are coffee (the cultivation of which has diminished of late years), tobacco, indigo, maize, rice, sugar cane, fruits of various sorts, vegetables, &c. Wheat does not thrive. The principal exports are sugar, rum, molasses, cacao, cotton, timber, dye woods, and dye stuffs. The total exports to Great Britain in the five years from 1868 to 1872 inclusive were as follows:

ARTICLES.	1868.	1869.	1870.	1871.	1872.
Rum	\$1,645,760	\$1,220,880	\$1,636,740	\$1,686,285	\$1,806,545
Sugar	6,008,745	4,405,500	5,405,230	5,064,800	5,287,810
Cacao	8,425	9,850	17,960	55,330	20,880
Molasses	101,785	103,910	22,200	22,230	25,190
Wood	382,750	149,110	70,000	40,005	43,605
Cotton	72,765	77,880	42,980	7,435	37,330
Sundries (dye stuffs, &c.)	56,005	78,560	98,620	78,760	83,985
Total	\$3,226,285	\$6,044,940	\$7,851,750	\$6,890,025	\$6,814,835

The imports from the same country in the same period were:

YEARS.	Value.	YEARS.	Value.
1868	\$3,355,520	1871	\$3,957,790
1869	8,271,835	1872	4,450,760
1870	4,238,190		
Total			\$19,243,795

The total exports for the year 1871 amounted to \$13,745,000, and the total imports to \$9,485,000. The internal communication is carried on by boats upon the rivers. In 1871 441 vessels entered and cleared. The finances of the colony in the same year were as follows:

Income	\$1,950,000
Expenditure	1,690,000
Surplus	\$260,000

The public debt was \$2,565,000. The government consists of a court of policy, of ten members, five of whom are official, the governor, chief justice, attorney general, collector of cus-

toms, and government secretary, and five non-official. There were 101 public schools in 1863 receiving public aid, and attended by 8,251 scholars; and the whole number of children receiving instruction in the colony was 12,425. In 1866 the schools numbered 118, with an average attendance of 6,615 pupils.—British Guiana was discovered by Vicente Pinzon in the spring of 1500, and the Dutch formed the settlements of New Amsterdam, Demerara, and Essequibo about 1580. The English, who settled in the neighborhood of New Amsterdam in 1634, withdrew in 1667. The colonies were attacked by the French in 1690 and in 1712, and a contribution levied on each occasion. A negro insurrection took place in 1762. The colonies were occupied by the English, under Gen. Whyte, in 1796, but were restored to the Dutch in 1802. They were retaken in 1803, and by an agreement between England and the Netherlands, concluded in 1814, retained by the former country. In 1831 they

were formed into one colony, under the name of British Guiana. Slavery was abolished in 1834, and the system of apprenticeship was abandoned in 1838. In 1827 the territory was included in the bishopric of Barbadoes and the Leeward Isles; but in 1838 it became an archdeaconry, and in 1842 was erected into a separate bishopric. **III. Dutch Guiana, or Surinam**, extends from the Corentyn to the river Maroni, lying between lat. 1° 20' and 6° N., and lon. 53° 15' and 57° 45' W. It is bounded N. by the Atlantic, E. by French Guiana, S. by Brazil, and W. by British Guiana; area, 55,785 sq. m.; pop. in 1871, 59,860, including 650 soldiers, 400 marines, 1,000 Indians, and 7,500 maroons or fugitive African slaves and their descendants, who live chiefly in the hill country. Paramaribo, on the bank and about 10 m. from the mouth of the Surinam river, is the capital; the governor's residence is at Zeelandia, a short distance N. of that city. Since the importation of slaves ceased, the population has gradually diminished; in 1852 it was 64,270. The country is flat and swampy near the coast, mountainous in the interior, and watered by numerous rivers. The products are the same as in British Guiana. The exports, principally cacao, sugar, rum, cotton, indigo, and other dyes and dye woods, are far from being as extensive now as when slavery existed. The total value of the exports to Great Britain in 1868 was \$406,980; 1869, \$369,650; 1870, \$544,420; 1871, \$823,295; 1872, \$874,890; of the imports in 1868, \$177,015; 1869, \$184,845; 1870, \$235,505; 1871, \$192,965; 1872, \$213,700. Surinam is an expensive colony to the Netherlands, as may be seen by the state of the finances in 1872, viz.: revenue, \$79,944 80; expenditure, \$480,274 40; deficit, \$300,329 60. The government is vested in a governor general and council.—Dutch Guiana was visited by the French in 1640. It was taken by the English in 1650, and granted by charter of Charles II. to Lord Willoughby in 1662. The Dutch took possession of it in 1667; the English retook it shortly afterward, but ceded it back to the Dutch in 1669. By the peace of Westminster it was allotted to the Dutch in exchange for the province of New York. It was again taken by the English in 1796, restored in 1802, recaptured in 1804, and again given up to Holland in 1814. **IV. French Guiana, or Cayenne**, lies between lat. 1° 15' and 5° 45' N., and lon. 51° 30' and 54° 35' W. It is bounded N. by the Atlantic, E. and S. by Brazil, and W. by Dutch Guiana; area, 40,140 sq. m.; pop. in 1868, 25,151. The territory includes the island of Cayenne (see CAYENNE), and is divided into the two districts of Cayenne and Sinnamary, and subdivided into 14 communes or arrondissements. The country near the coast is flat, marshy in some parts, and in others covered with forests of mangroves. The climate is much hotter and more unhealthy than in the other divisions of Guiana. The products of the other two col-

onies are likewise found here, with the addition of pepper (especially the kind bearing the name cayenne), cloves, cinnamon, nutmeg, &c. The state of agriculture is very low. The total exports in 1864 amounted to \$265,475, and the imports to \$1,956,765. The governor has a privy council, with a colonial council of 16 members elected by the colonists.—The country was settled by the French in 1604, and again in 1635. The English seized the colony in 1654, and held it till 1664. The Dutch took it in 1676, but were obliged to restore it to the French in 1677. It was again taken by the British in 1809, and finally restored to France at the peace of Paris in 1814.

GUICCIARDINI, Francesco, an Italian historian, born in Florence, March 6, 1482, died near that city in May, 1540. At the age of 23 he held a professorship of law, and was afterward appointed ambassador to Ferdinand the Catholic. He was soon called to the court of Leo X., who made him governor of Modena and Reggio, which dignity he retained under Adrian VI. Clement VII. sent him to the Romagna, where he succeeded in quelling the conflicts of the Guelphs and Ghibellines. As lieutenant general of the pope he defended Parma against the enemy, and subdued the revolted city of Bologna, after which he retired (1534) to Florence and commenced his history. On the assassination of Alessandro de' Medici, he exerted himself to defeat the project of the senate for restoring the republic. Cosmo de' Medici was made governor by his influence, but soon exchanged this title for that of duke, and assumed absolute power in the state, when Guicciardini, who had been attached to him, resigned his office and retired. Of his "History of Italy," the first complete 16 books appeared in 1561, edited by his nephew. A few years afterward four more were added, but these are not complete. It has since been often reprinted in 20 vols., but the best edition is that by Rosini (10 vols., Pisa, 1819-'20). Among the other remains of Guicciardini are *Consigli aurei ed avvertimenti politici* (translated into French, Paris, 1577), and parts of his correspondence published by Bernigio under the title *Considerazioni civili sopra l'istoria di Francesco Guicciardini* (Venice, 1582), and under that of *Legazione di Spagna* (Pisa, 1825).

GUICCIOLI, Teresa, countess, born about 1802, died in Rome, March 26, 1873. See BYRON.

GUICOWAR, or Guikwar, Dominion of, or Baroda, a tributary state of British India, in the division of Guzerat, province of Bombay. The former dominions of the Guicowar comprised about 29,400 sq. m., lying around the gulf of Cutch, between lat. 20° 40' and 24° N., and lon. 69° and 74° E. The present Baroda, which is all that remains under the nominal rule of the native prince, has an area of 4,400 sq. m.; pop. about 350,000. (See BARODA.) For its physical characteristics, see GUZERAT.

GUIDI, Tommaso. See MASACCIO.

GUIDO ARETINO. See ARETINO.

GUIDO RENI, an Italian painter, of the Bolognese school, born near Bologna in 1575, died there in 1642. He studied under Denys Calvaert and Ludovico Carracci, and went to Rome, where his "Martyrdom of St. Cecilia" was very successful. He received an order from the pope to decorate the private chapel of the palace of Monte Cavallo, but became disgusted with the parsimony of the papal treasurer and returned to Bologna, where he painted the "Massacre of the Innocents." Recalled by the pope to Rome, he executed a number of important works, including his frescoes of the "Aurora" in the Rospigliosi palace, the "Concert of Angels" in the apsis of the Capella Sta. Silvia, the "St. Andrew" in the chapel of that name, and the painting of "Fortune" in the gallery of the capitol. He was invited to Naples, and had nearly finished the "Nativity," now in the choir of San Martino, when he was driven away by the jealousy of the Neapolitan artists. The remainder of his life was passed at Bologna. At this period he gave himself up to play, and painted rapidly and carelessly. Many of his later works are unfinished, and some which bear his name are by his pupils. The best of this period are his "Assumption," in the gallery at Munich, and the Madonna with angels, now in Bologna.

GUIENNE, an ancient province in S. W. France, a part of the old kingdom of Aquitaine, bounded N. by Saintonge, Angoumois, Limousin, and Auvergne, E. by Languedoc, S. by Languedoc and Gascony, and W. by the bay of Biscay. In 1152 the duchy passed to Henry Plantagenet (afterward Henry II. of England) through his marriage with Eleanor, niece of William X. of Aquitaine. The kings of England maintained their possession of it with some interruption till 1451, when it was conquered by the army of Charles VII., under Dunois. Out of the territory of Guienne the departments of Gironde, Lot, Lot-et-Garonne, Dordogne, Aveyron, and part of those of Landes and Tarn-et-Garonne, have been formed.

GUIGNES. **I. Joseph de**, a French orientalist, born in Pontoise, Oct. 19, 1721, died in Paris in March, 1800. When only 20 years old he was an extraordinary sinologue. In 1752 the royal society of London elected him a member, and in 1754 the French academy of inscriptions did the same. His principal work was *Histoire générale des Huns, des Turcs, des Mogols et des autres Tartares occidentaux, avant et depuis J. C. jusqu'à présent* (5 vols. 4to, 1756-78). He was appointed in 1757 professor of Syriac in the collège de France, and in 1769 keeper of the antiquities in the Louvre. He wrote several essays and papers, among which was a curious *mémoire* in which he contends that the Chinese are but an Egyptian colony. **II. Chrétien Louis Joseph**, son of the preceding, born in Paris, Aug. 25, 1759, died March 9, 1845. For 17 years he was French resident and consul at Canton. He published, besides several other papers, *Voyages à Péking, Manille*

et l'Île de France (3 vols. 4to, 1808), and edited under his own name in 1813 a *Dictionnaire chinois, français et latin*, which was really only the *Han-tsé-sy-y* of Basilus de Glemona revised and enlarged.

GUILD, or *Gild* (Sax. *gildan*, to pay), a name given in England and France to societies organized for mutual aid and protection, as well as to confraternities whose chief object is piety or beneficence. The denomination of confraternity (*confrérie*) was formerly bestowed in France on lay brotherhoods united for secular as well as for religious purposes; it is now restricted to pious and charitable organizations. Before the reformation the term guild was used in England indifferently for both, and it is often so applied at present. **I. SECULAR GUILDS.** Societies of artisans were organized in Rome at a very early period, and, together with merchants' corporations, continued to increase in numbers and importance until the fall of the republic. Their turbulence caused them to be suppressed in the consulship of L. Cæcilius and J. Martius; but they were restored by Clodius. Incorporated with fixed statutes under the last Cæsars, they spread all over the empire. The Christian religion found them among the laboring classes in the East and West, infused into them its active spirit of brotherly charity, and thus the old pagan corporation (*collegium*) became the Christian guild. In 364 Valentinian I. confirmed the privileges granted by preceding emperors to the trades' corporations, and about this epoch each trade became a separate guild, whose members, as well as their offspring, could embrace no other calling. As a compensation, the guilds were empowered to accept donations and legacies, and to inherit the property of intestate members. They were also bound to provide for the requirements of the public service, and in return obtained in many instances most lucrative monopolies. Throughout the West these societies are called by early Christian writers *collegia opificum*, companies of craftsmen. In Piedmont some charters of guilds date from the year 707. The records of Ravenna mention a guild of fishermen in 943, one of merchants in 953, and "a provost of the guild of butchers in 1001." In southern Gaul the municipalities from time immemorial had their confraternities of tradesmen, forming the great body of free citizens, and their consuls, as the chief magistrates were called. Nor was it otherwise in northern Gaul, when the invasion of the Franks came to disturb the social growth of centuries. The annals of the Merovingian kings mention a college or guild of jewellers or workers in gold and silver; and the edicts of Dagobert designate a guild of bakers. In 1061 Philip I. granted privileges to the master chandlers. Louis VII. in 1162 speaks of "the ancient customs of the guild of butchers," and granted to the widow of one Ives Laccobre and her heirs the right of collecting the moneys due to the royal treasury by the guilds of leather dressers,

shoe and harness makers, &c. The most ancient of chartered French guilds is the *hanse* of merchants and watermen of the Seine, which is supposed to have sprung from the Parisian "nautes" (Lat. *navita*, sailors or boatmen) existing in the time of the Romans. This body had absolute control of the trade carried on by the watercourses of the Seine and the Yonne between Mantes and Auxerre; no merchant could bring his wares into Paris without becoming a member of this guild or obtaining from it *lettres de hanse*. Similar guilds sprang up in most of the commercial cities situated along the other river courses or on the seashore. Sometimes several of these formed a commercial league, such as existed between the Hanseatic towns of Germany. Above the trades were several privileged guilds, such as the merchants' guilds called *les six corps*, viz.: drapers, grocers, haberdashers, furriers, hatters, and jewellers.—According to Sismondi, the cities of Flanders and Holland secured the benefit of self-government before those of France or Italy; and Thierry deduces this fact from the institution of guilds or fraternities among the burghers. Two essential characteristics belonged to them, the common banquet and the common purse. In many instances they had a religious, and in some a secret ceremonial, to knit more firmly the bond of fidelity. From the private guild, possessing the vital spirit of faithfulness and brotherly love, sprang the sworn community, the body of citizens, bound by a voluntary but perpetual obligation to guard each other's rights against the thefts of the weak or the tyranny of the powerful. The progress from the guild to the corporation can be traced in other European countries; but in the Low Countries from time immemorial they are found to co-exist. All through the middle ages the Dutch and Flemish guilds exercised a preponderating influence. There is not a cathedral or church edifice of any importance in Holland or Belgium but contains some pictorial or sculptured monument commemorative of some great event connected with these guilds, and representing their costumes, banners, corporate seal, or public festivities. In Paul Lacroix's *Mœurs, usages et costumes au moyen âge*, are engravings of various trades' guilds of St. Trond, Hasselt, Bruges, Maestricht, Antwerp, and Ghent.—In Germany the immunities and privileges enjoyed under the Roman domination by the brotherhoods of craftsmen were swept away by feudalism; the condition of the workmen was one of serfage down to the time of the emperor Henry I. (919–36). During the next two centuries the guilds banded themselves together, and gradually acquired such power in the cities that they rivalled the nobles in influence and aimed at controlling the municipal government. Charlemagne had felt their power, and in his capitularies laid down rules limiting the growth of guilds in conformity with local needs. The emperors Frederick II. and Henry

VII. vainly attempted long afterward to suppress the guilds, whose incessant contests with the nobility led to frequent bloodshed.—The whole laboring population of England during the Anglo-Saxon period was virtually organized into guilds. The charters of many English guilds date from the 10th century; the steelyard merchants (*gilda Theutonicorum*) existed before 967, and were chartered in 1232; the establishment of the saddlers' company dates from the same epoch. Trade guilds are mentioned in the *Judicia Civitatis Londoniæ*, compiled by King Athelstan, and in other Anglo-Saxon laws; they must therefore have existed in 939. But it is certain that others existed before that; lawyers agree that the stallings of Sunderland, the dredgers of Whitstable, and the free fishermen of Faversham have existed from time immemorial. Another famous brotherhood was the enichten or knigten guild, which existed in the reign of Edgar (died in 975), and was chartered by Edward the Confessor (1042–66). All this confirms the assertion of Lingard, that at the Norman conquest there were guilds not only in the chief cities of England, but in the surrounding rural districts, all organized on the same principles. The boroughs were made up of guilds of tradesmen, who had conquered their freedom by their union; and in each borough these guilds formed one body *politio* with common rights and common interests. They had each their hall or hanse house, in which they met and deliberated; they exercised the power of enacting by (or borough) laws; and they possessed, by lease or purchase, houses, pasture, and forest lands for the common use. Under Norman rule, the growth of guilds was much interfered with at first. Henry I. (1100–35) commanded that all should receive the royal license; and he subjected several guilds, secular and religious, to heavy fines, because they had been established without license, or exercised their functions independently of it. This penalty fell heavily on London, where the religious guilds or confraternities were very numerous. They were much encouraged by Henry II.; but as they increased under this patronage, and were much given to parading with their respective "liveries" and banners, collisions between rival trades became so frequent that at length under Henry IV. they were forbidden to wear their liveries. In subsequent reigns they were permitted to appear in them at coronations, and finally it became necessary to obtain the royal license for appearing in public with their insignia. The term "livery company" was substituted for that of guild in the reign of Edward III. (1327–77), and has been applied ever since to the London trades in particular. The most ancient of these is believed to be the guild of woollen weavers (*gilda telariorum*), chartered by Henry I. In Stow's time there were in London 63 livery companies, 12 of which are called by him "honorable companies out of which the lord mayor

is to be chosen yearly." At the present day there are 89 such guilds in London, 39 of which have halls of their own, the others meeting in Guildhall or in certain taverns. The freemen or liverymen of "the city" elect two candidates for the mayoralty, one of whom is chosen by the court of aldermen; the liverymen also elect the sheriffs and chamberlain. Many relics exist in other English cities to attest the importance of guilds in the middle ages. Once in 20 years, toward the end of August, Preston celebrates "guild day" by a solemn procession, in which the corporation and all the local guilds take part. Throughout Norfolk, in Norwich, Aylesham, Lynn, and Worstead, survive memories of the numerous and powerful guilds of woollen workers (carders, spinners, weavers, fullers, shearers, &c.), who contributed so much in their day to the commercial prosperity of England.—In Great Britain, in spite of the severe control exercised by the crown, the establishment of guilds and the exercise of independent trade were not subjected to the tyrannical restraints which existed on the continent. All trades were equal in England; every individual was free to choose the craft to which he wished to belong; and the road to apprenticeship and mastership was equally open to all. Besides, as membership in an English borough soon came to be coupled with the right of suffrage, numbers of men who did not belong to the craft sought to obtain the freedom of the guild. But the common law, the watchful jealousy of the civil courts, and the spirit of the nation did not allow these organizations to cover the land with their network as they did in France and Germany. Beyond the limits of the boroughs, which were the centres of the great industrial guilds, labor and trade flourished in freedom over a wide domain. Still, ever since the time of Edward I., they had their distinctive liveries and banners, lived ordinarily in the same street, and not unfrequently occupied an entire ward or quarter, and were, in fact, so many close corporations. Many of the guilds in England and Scotland maintained up to a recent date their characteristic exclusiveness; no person who was not free of the borough or of certain of these guilds was permitted to open a shop for merchandise, or exercise certain trades within the borough. These restrictions were abolished in 1835; and their place has since to a large extent been taken by the trades' unions.—In France the guilds were under the immediate control of the high officers of the crown. Thus the high chamberlain governed all the trades which bore a relation to his office, such as clothiers, upholsterers, &c.; the master of the horse was head of the farriers, &c.; and so with the other officials. They disposed of the masterships in each trade, delivered patents, and collected the heavy fees attendant on mastership. This authority was delegated to lieutenants, who had a superintendence of their re-

spective trades throughout the kingdom, and were called "kings of guild." They maintained in the 14th century a courtly retinue of subordinates at the expense of the tradesmen, decided all civil and criminal questions among their subjects, visited merchants' and tradesmen's houses and workshops to discover frauds, imposed fines, levied taxes, and exacted pleasure money for their own use. Between the kings of guilds themselves arose frequent conflicts of jurisdiction, in which rival pretensions were sustained by armed force; while the provosts of the various cities strenuously resisted all exercise of authority over the guilds by these officials as a usurpation of their own. The tradesmen were invariably called upon to support these conflicting claims, which led to continual riots and bloodshed. However, the authority of the provosts prevailed in the end, because their interests were identified with those of the workmen. Each craft or "mystery" had, besides the officers thus imposed upon it by the crown, its own chosen chiefs, designated as masters, deans, wardens, syndics, &c. It was the duty of these to visit at all hours the workshops of members of the guild and their salesrooms, to enforce the strict rules of the craft, and to examine candidates for apprenticeship and mastership. In France the exclusive *esprit de corps* permitted but few to find admittance into a craft. The children of a master workman were alone free from the usual restrictions. Each trade was divided into three classes, masters, companions, and apprentices. Apprenticeship began between the ages of 12 and 17, and lasted from 2 to 10 years. In most trades a master was allowed only a single apprentice besides his son. Tanners, printers in color, and jewellers might have a second apprentice, provided he were, if possible, a kinsman. Butchers and bakers were permitted to have any number of apprentices they required. Candidates for a mastership underwent a most trying ordeal. They had to work alone, under the supervision of the syndics or judges, in order to produce a "masterpiece," or faultless piece of handicraft, besides fabricating all the tools and machinery in use in the craft. A mastership was only recognized within the borough limits. No work was to be done by night, because the trade required all workmanship to be thoroughly good. Morality and concord were secured by stringent regulations. Illegitimate children could never become apprentices; and a stainless reputation was also necessary. Known immorality or irregularity of conduct was sufficient cause of expulsion from the guild. Each guild had its patron saint. Crispin and Crispinian were the patrons of shoemakers, and St. Joseph of carpenters. The patron saint had a special chapel dedicated to him in the nearest parish church or cathedral; it was furnished and decorated by the guild, and served for all ceremonies in which the craftsmen were interested. The guilds aided sick members, and

took care of the families of deceased members. At a later period a union of kindred guilds enabled workmen to get employment in any city.—Among the guilds of the middle ages which exercised a widespread influence, were the brotherhoods of artisans (masons, carpenters, workers in bronze and iron, painters of stained glass, &c.), who were employed on public constructions. Even before the appearance of the ogival or Gothic style of architecture, the erection of the beautiful round-arched cathedrals and municipal edifices of eastern and western Europe had employed hosts of craftsmen and artists. Their guilds had been everywhere special objects of favor from the civil and ecclesiastical authorities; the popes themselves bestowing on them the most coveted franchises and immunities. They were taken under the pontifical protection and declared free from the burdens which weighed on the masses, and from which the other trades and professions were not exempt. They were in consequence denominated “free.”—Guilds were not limited to merchants, mechanics, and laborers; the liberal arts and the higher professions had also kindred organizations. In France the “order of advocates” has been, from the 14th century at least, a guild with its head in Paris and branches in all the cities. The distinction between the judicial body and the bar (*la magistrature et le barreau*) became at an early date quite marked, one profession excluding the other, although both were inseparable coördinates in the administration of justice. St. Louis in his *Établissements* has several statutory enactments concerning the body of advocates or *avantparliers*. The edicts of 1274 and 1291, issued by his successors, regulate the maximum fee to be paid an advocate in each case. In 1315 the advocates of Toulouse gave, as a body, a large sum toward the expenses of the war in Flanders. An order of the parliament of Paris in 1344 prescribes that no lawyer shall be heard in court whose name is not inscribed on the roll of advocates (*rotulus nominum advocatorum*); and a royal edict of 1364 commands all advocates to plead gratuitously the cause of the poor. In every city where there was a parliament they had their dean or *bâtonnier*, elected by themselves, and a council which judged of the qualifications for membership. The applicant must be a graduate, licentiate, or doctor in laws, and after his admission pass three years as a *stagiaire*; the council then decided whether his name should be placed on the roll. When this had been done, the advocate had the right of pleading in any court of the land where his services were asked for. The profession was incompatible with any salaried function, commercial pursuit, or labor for wages, as well as with the position of notary, *avoué*, or clerk; but not with any dignity that was purely honorific. The amount of their fees was left to the generosity of the client; any attempt to exact them or sue for them entailed

expulsion from the order. These qualifications and privileges are substantially true of the order in its present state. It was suppressed in 1790, and reestablished with many limitations in 1810, but was not looked upon with favor by Napoleon I. Connected with the “order of advocates” in France was *la basoche*, or guild of lawyers’ apprentices (from Lat. *basilica*, a court of law, and old Fr. *baseuque* and *basoque*) of the parliament of Paris. This guild was authorized by Philip the Fair in 1303. It preserved throughout its existence the character of an essentially lay organization. The title of kingdom (*royaume de la basoche*) was bestowed upon it from its infancy, and its chief was authorized by royal edict to assume the title of king, to wear the robes of royalty, and to surround himself with high officers named after those of the crown, and vested within the brotherhood with supreme civil and criminal jurisdiction. The king of this guild had his own great seal, kept by his high chancellor; coined money of gold and silver, which was a legal currency in all transactions between members of the guild and all who trafficked with them; and had his army, consisting of the members mounted and equipped. This army sometimes paraded as many as 10,000 cavaliers arrayed in blue and yellow; it furnished a cavalry corps of 6,000 members to Henry II. in 1548, which aided effectively in quelling the revolt in Guienne. Their charter obliged them to parade annually; and the pageant never failed to draw immense crowds to Paris, all the more so as they soon added to the military spectacle dramatic representations, in which the vices of all classes in church and state were held up to merciless ridicule. This custom and their numbers so alarmed the cruel and superstitious Henry III. that he suppressed the office and title of king of *la basoche*, and forbade their parades and representations. Thus deprived of their prestige, they maintained their organization down to the end of the last century, and furnished an armed battalion at the commencement of the French revolution, which figured prominently on several occasions, appearing for the last time at the assault on the Bastille. The *basochiens* were suppressed with all other corporations in 1791. Besides the above organization among the clerks of the Parisian parliament, the *châtelet* and the *cour des comptes* had their *basoches*. The provincial parliaments organized guilds similar to that of the capital, and vying with it in influence, turbulence, literary activity, and joyousness of spirit.—The members of the Scottish bar form a guild, with the title of faculty of advocates, which has existed from immemorial custom, with constitutional privileges founded on no statute or charter. The body formed itself gradually from time to time on the model of the French guilds of advocates, appointing like them a dean, who is their presiding officer.—A “guild of literature and art” was originated in 1851 by Charles Dick-

ens and Lord Lytton, for the relief of indigent men of letters and artists. A fund was created by a distinguished party of amateurs, who gave representations of the comedy "Not so Bad as we Seem;" and three buildings were erected near Stevenage in Hertfordshire, on ground given by Lord Lytton, and inaugurated July 29, 1865. II. RELIGIOUS GUILDS, also called confraternities or sodalities (Lat. *sodalitas*, companion), have always been numerous and popular in Roman Catholic countries. Some of them, like the confraternity of bridge builders (*fratres pontifices*), were closely allied to the guilds of carpenters and masons, devoting themselves in the 13th century to opening and repairing roads, building bridges, maintaining cheap or gratuitous hostleries, and watching over the safety of travellers. Kindred to these were the confraternities established during and after the crusades, to prevent wars between the feudal lords, to protect widows and orphans from oppression, to guard churches and monasteries from violence, and repress the bands of roving mercenaries (*routiers*) who infested the highways of Europe. Such were the confraternity of "the truce of God," the *confrérie de Dieu* in Normandy, the "militia of Christ" in northern Italy, and even the *Vehmgerichte* of Westphalia. These confraternities, much as they may have been perverted from their original purpose, sprang from motives of religion and beneficence. The confraternities devoted to works of pure charity were innumerable. In Rome before the late change of government upward of 200 such guilds were in activity; and the other cities of Italy were little inferior in this respect. Paris, after Rome, counted the largest number of confraternities, prominent among which are the sodality of St. Vincent de Paul, known throughout the United States, and the societies of St. Francis Xavier and St. Francis Régis, which aim at doing away with concubinage among the laboring classes, &c. The *confrérie de la passion*, organized for the purpose of representing on Sundays and holidays the mysteries of Christ's passion and other Biblical subjects, was originally a lay brotherhood attending on the sick in the hospital of La Trinité in Paris. The entertainments which they instituted for the convalescents in one of the wards soon became so popular that the king gave them a monopoly of all such plays. In 1543 they opened a *salle de spectacle* in the rue de Mauconseil, which became the cradle of French comedy. But as the edict which renewed their charter of monopoly forbade pagan plays and other than sacred dramas, they renounced profane theatricals as inconsistent with their religious garb, and made over their privilege to another company. Religious guilds have recently much increased in England, as well among Roman Catholics as among those called ritualists in the church of England and in the Protestant Episcopal church in the United States. A list of the latter is given in the "Church Union Almanac" for

1869. In the United States and British North America confraternities are both numerous and flourishing; temperance and mutual benevolent societies among Roman Catholics generally take this form, having prescribed religious practices, a patron saint, and stated feast days.

GUILDFORD, a municipal and parliamentary borough, market town, and the capital of Surrey, England, on the right bank of the Wey, 29 m. S. W. of London, at the junction of a branch of the Southwestern with the Guildford and Reigate railway; pop. in 1871, 9,801. The town stands on a declivity sloping toward the river, which is here crossed by a handsome bridge. There are three parish churches, a hospital, a theatre, barracks, several schools, and the Guildford institute, with library and reading room. The chief manufactures are paper, powder, bricks, coaches, iron, and malt liquors; the trade is mostly in timber, grain, malt, and live stock. In 1036, under the reign of Harold I., Alfred, son of Ethelred II., after landing in Kent with the design of recovering the kingdom, was induced to enter Guildford, where he was made prisoner in the night, and his 600 Norman attendants were massacred.

GUILFORD, a N. W. county of North Carolina, drained by Deep river, a branch of the Cape Fear, and by Reedy fork of Haw river; area, 600 sq. m.; pop. in 1870, 21,736, of whom 6,080 were colored. The surface is undulating and abundantly timbered; the soil is fertile, well watered, and highly cultivated; and there is a copper mine. It is traversed by the Richmond, Danville, and Piedmont, and the North Carolina railroads. The chief productions in 1870 were 132,783 bushels of wheat, 308,347 of Indian corn, 169,847 of oats, 22,521 of Irish and 23,468 of sweet potatoes, 149,490 lbs. of butter, 31,461 of wool, 177,782 of tobacco, and 5,761 tons of hay. There were 2,790 horses, 4,791 milch cows, 6,859 other cattle, and 13,302 sheep; 1 cotton factory, 18 flour mills, 10 tanneries, 8 currying establishments, and 1 manufactory of wagon material. Capital, Greensborough.

GUILFORD, a town and village of New Haven co., Connecticut, on Long Island sound, and on the Shore Line division of the New York, New Haven, and Hartford railroad, 15 m. E. of New Haven; pop. in 1870, 2,576. The village has an antiquated appearance, but contains a few handsome buildings, the chief of which is a high-school building of stone. In the centre is a public square, on which front the hotel, the principal stores, and four churches. There are few manufactures, the inhabitants being engaged chiefly in farming and maritime pursuits. The harbor is visited by fishing and coasting vessels. About 1 m. S. of the village is the Point, a favorite watering and bathing place; and 3 m. S. W. is the watering place called Sachem's Head. Guilford is the birthplace of Fitz-Greene Halleck, and here he spent the last years of his life. Here also the regicides Goffe and Whalley were for a time secreted. The

first settlement in the town was made by a party of English nonconformists in 1639, and the residence of their leader, the Rev. Henry Whitfield, called "the old stone house," is still standing, near the railroad station.

GUILFORD COURT HOUSE, a locality about 5 m. from Greensborough, Guilford co., N. C., memorable for a battle fought, March 15, 1781, between the Americans under Gen. Greene and the British under Lord Cornwallis. The American force numbered 4,243 foot and 161 horse, about 1,500 being regular troops, and the rest mainly raw militia. The British were about 2,400 strong, and consisted chiefly of veteran soldiers. Greene had chosen a strong position on the declivity of a hill, and drew up his army in three lines. The battle began shortly after 1 o'clock with a brisk cannonade on both sides, during which the British advanced upon the North Carolina militia, posted across the road, who after a discharge of musketry threw away their arms and accoutrements and fled through the woods. The Virginians of the second line, however, who were in a wood 300 yards in their rear, poured a galling fire upon the advancing troops; but their right finally retreated before the bayonet and fell back to the court house, and the left soon followed their example. The whole British infantry was now engaged, while the flower of the American army was still in reserve. The British pressed forward to the third line, composed of regulars under Huger and Williams, posted near the court house. The first regiment of Maryland continentals received them with a well directed fire, and before they recovered from the shock routed them with the bayonet. The second regiment of Marylanders, however, fled at the first onset, leaving two field pieces in the hands of the enemy; but the pursuers were repulsed by the victorious first regiment, and driven back in confusion by Lieut. Cols. Howard and Washington. To check the pursuit, Cornwallis ordered his artillery to play upon the Americans. The expedient was successful, but he was forced to fire full in the face of his retreating guards, and only half the battalion was extricated. The British line was now formed anew, and Greene, convinced by the flight of his militiamen and the Maryland continentals that a fresh conflict would result in the annihilation of his army, ordered a retreat. The British lost more than 600 in killed and wounded; the Americans lost about 400 killed and wounded and 850 missing. Notwithstanding his victory, Cornwallis was so much crippled that he retreated on the 18th with the Americans in full pursuit.

GUILLEMOT, an arctic web-footed bird, of the family *alcedidae*, and subfamily *urinae*, including the genera *uria* (Möhring), *brachyrhamphus* (Brandt), and *mergulus* (Ray). The last, to which the little guillemot belongs, has been described under Auk. The genus *uria* is characterized by a moderate head; rather long, straight, and pointed bill, with a distinct angle on the under mandible; wings short and point-

ed, with the first quill longest; tail very short; tarsi shorter than middle toe; legs short and robust; toes rather long, fully webbed; claws strong and curved; hind toe wanting. The general form is short and robust, the size never large, and the prevailing colors black and white. There are about seven species, inhabiting the arctic seas between America and Asia, migra-



Guillemot (*Uria grylle*)—Summer Plumage
a. Head. b. Foot.

ting to temperate regions during winter. The flight is rapid, with short flaps, near the surface of the water; they are excellent swimmers and divers, but poor walkers from the shortness and posterior position of their legs; they feed on fish and other products of the sea; they deposit usually a single egg, of large size, on rocks overhanging the water, breeding in large companies. The black guillemot (*U. grylle*,



Guillemot and Young—Winter Plumage.

Lath.) is 14 in. long, and 22 in. in extent of wings; the general color in summer is black tinged with green; a large transverse oval spot on the wing, under wing coverts, and axillaries,

white; bill black, and feet red; in winter and in the young plumage, the under parts, neck, and rump are white, the head above and back dark brown. This species is found breeding, about June, from the arctic regions to the bay of Fundy; according to Audubon, it lays three eggs, in a nest composed of pebbles; the eggs are about $2\frac{1}{2}$ by $1\frac{1}{2}$ in., of an earthy white color, blotched with dark purplish black toward the larger end; they are delicate and nutritious articles of food, and even the black and tough flesh has proved palatable to many an arctic voyager. There is a variety on the N. W. coast (*U. columba*, Pall.), resembling the preceding, except that the white of the wing is divided by a diagonal band of brownish black. The foolish guillemot (*U. troile*, Linn.; *U. lomvia*, Brün.) is about 17 in. long, and 30 in extent of wings; the general color above is grayish black, tinged with dark brown on the sides of the head and neck; a bar on the wings, and a line encircling and behind the eye, white; under parts white; feet greenish black. It is occasionally found as far south as New York, but breeds in numbers on the coast of Labrador; the female lays a single egg of large size, white with dark blotches, on the bare rock, and, like the other species, plucks feathers from the abdomen over a space large enough to cover the egg; both sexes assist in incubation. The plumage is exceedingly dense, and admirably adapted for a creature exposed to severe cold; the flesh is tough, and eaten only by hungry seamen; the eggs are highly esteemed as food. They are rapid fliers, and such bold swimmers and divers as to defy the highest waves. The thick-billed guillemot (*U. arva*, Pall.) is probably a mere variety of the last, differing only in its shorter and wider bill. The guillemots allow man to invade their retreats and knock them down with clubs; this apparent apathy is owing to the structure of the bird, which is ill calculated for progression on land, but admirably adapted for a life on the water. The above described species are found also on the northern shores of Europe.—The genus *brachyrhamphus* includes the smaller guillemots, with a larger head, shorter bill densely covered with feathers at the base, curved upper mandible, and in other respects as in the preceding genus. The marbled guillemot (*B. marmoratus*, Gmel.) is about 10 in. long, brownish black above, tinged with ashy on the back, with two white spots on each side of the back; ring round hind neck, and under parts, white, bill black, and feet yellow; the young have the upper feathers with reddish edges, and the under parts spotted and marbled with brownish black and white. Several others inhabit the North Pacific, and are most abundant about the N. W. coast of America. The name of guillemot is given to the horn-billed auk (*cerorhina monocerata*, Pall.) of N. W. America. The habits of all the guillemots are the same; their numbers, beauty, activity, and useful properties have been the admiration of all arctic voyagers,

many of whom have been saved from starvation by their eggs and flesh.

GUILIM, John, an English writer on heraldry, born in Herefordshire about 1565, died in London, May 7, 1621. He was educated at Oxford, subsequently became a member of the society of the college of arms in London, and in 1617 was appointed rouge-croix pursuivant of arms. His reputation rests upon the work entitled "The Display of Heraldry," first published in 1610, which has passed through many editions; that of 1724, containing in addition "A Treatise of Honor, Civil and Military, by Captain John Logan," is considered the best. The book was published in Guillim's name, but is said to have been written by John Barkham.

GUILLOTIN, Joseph Ignace, a French physician, born in Saintes, May 28, 1738, died in Paris, May 26, 1814. He studied under Antoine Petit, graduated as doctor in medicine in 1770 at Rheims, and became professor of anatomy, pathology, and physiology in Paris. He was one of the commissioners appointed to investigate the experiments of Mesmer in animal magnetism, and joined with Lavoisier, Bailly, and Franklin in their celebrated report upon that subject. In 1788 he increased his popularity by a pamphlet in favor of giving the *tiers état* a representation equal to that of the two other orders, and was elected in 1789 to the constituent assembly. In that body he brought forward various sanitary measures. His name, however, is principally associated with the proposition which he made that decapitation, a mode of punishment previously reserved for nobles and regarded as less ignominious than death by hanging, should be adopted for criminals of all classes. He also proposed that the decapitation should be effected by machinery instead of by the axe or the sword, in order that the suffering might be less. In 1791 Guillotin's motion was renewed in a somewhat altered form by Lepelletier de Saint-Fargeau; and on March 20, 1792, the legislative assembly, on a report presented by Dr. Antoine Louis, the perpetual secretary of the academy of surgery, adopted a resolution ordering a machine for decapitation described by the same to be adopted. This machine, in the invention and construction of which Guillotin had no share whatever, received at first the name of *louison* or *louisette*, which was soon superseded by that of *guillotine*, first used in a satirical song published in the royalist newspaper *Les actes des apôtres*. Guillotin was imprisoned during the reign of terror, and afterward resumed medical practice.

GUILLOTINE, an instrument for inflicting capital punishment by decapitation. It consists of an oblique-edged knife, heavily weighted, sliding easily between two upright grooved posts, and descending on a block where the head of the sufferer rests. This machine, which was brought into use in the early period of the French revolution, is not altogether a

modern invention. Similar contrivances were in use in several parts of Europe during the 16th and 17th centuries, if not before. According to Crusius, in his *Annales Suevici* (1595), such an instrument of decapitation existed in early times in Germany, but was superseded by the sword; it was styled *Fallbeil*, falling hatchet. A representation of it may be seen in two old engravings, the one by Georg Penez, who died in 1550, the other by Heinrich Aldegrever, bearing the date of 1553; and also in an old picture which, according to Reiffenberg, is still preserved in the city hall of Augsburg. Jean d'Autun, the historiographer of Louis XII. of France, narrating an execution which he witnessed at Genoa, May 13, 1507, describes a machine exactly like the guillotine. This is the *mannaia*, which was used in all parts of Italy for the execution of men of rank, and is fully described by Père Labat in his *Voyage en Espagne et en Italie* en 1730. The same had been introduced into southern France, and Puysegur in his *Mémoires* makes an allusion to it on occasion of the execution of Montmorency in 1632. A similar contrivance existed in the Netherlands. The "maiden" of Scotland, which was used in the decapitation of the regent Morton in 1581, and is still preserved in the museum of the antiquarian society at Edinburgh, was an instrument akin to those above mentioned, and either it or at least the pattern of it had been brought from abroad by the very man who suffered by it. The decapitating machine, therefore, was far from being a novelty when Dr. Guillotin suggested its application in 1789. The scheme being submitted to the carpenter employed by the government, he demanded 5,000 francs for making the instrument; but a German named Schmidt offered to build it for a much smaller sum; and finally a bargain was struck at 824 francs, Schmidt contracting to furnish 83 machines of the same kind, one for each department. The machine was first tried, April 18, 1792, upon three corpses at the Bicêtre hospital, and worked so satisfactorily that seven days later it was used publicly for the decapitation of Pelletier, a highwayman under sentence. Sömmering, in the *Moniteur* of Nov. 9, 1795, denounced it as too rapid in its operation, and maintained that sensation does not cease immediately after the head of the sufferer has been severed from the body. The controversy was kept up by Sue, Oelsner, Cabanis, and others. In the same year appeared Sédillot's *Réflexions historiques et philosophiques sur le supplice de la guillotine*, and in 1796 the *Anecdotes sur les décapités*. The question has been renewed at different times and in various forms, particularly in an article in the London "Quarterly Review" for December, 1846, republished separately in 1850; Louis Dubois's *Recherches historiques et physiologiques sur la guillotine* (Paris, 1843); and Ludovic Lalanne's *Curiosités des traditions, des mœurs et des légendes* (1847).

GUILMETH, Alexandre Auguste, a French archaeologist, born at Brionne, Eure, Dec. 2, 1807. He was educated at the college of Bernay, and has been successively master of studies in the college of Rouen, inspector general in that of Amiens, and censor and superintendent in the colleges of Dieppe and Juilly. He early devoted himself to the study of the archaeology of Normandy, and has published many historical works on its celebrated localities and cities, including Brionne, Pont-Audemer, Évreux, Dieppe, Havre, Yvetot, and Elbeuf, all of which have been collected under the title *La description historique de la Normandie* (12 vols. 8vo, 1836-'50), with plans and engravings. A *Notice biographique et littéraire sur A. A. Guilmeth* was published in 1860.

GUIMARAENS (Port. *Guimarães*), a town of Portugal, in the province of Minho, between the Ave and Vizella, 32 m. N. E. of Oporto; pop. about 8,000. The town stands on a gentle slope, nearly surrounded by an amphitheatre of hills, is generally well built, and has several good streets and public squares. It is fortified, and contains an ancient castle, with square towers at the angles and in the middle of each side. The keep, which is in the centre, is entered at mid-height by a wooden bridge. Among the public buildings are a fine collegiate church called the cathedral, a Dominican convent of the 14th century, and a hospital. There are manufactories of cutlery, iron ware, paper, leather, cotton, and linen; and large quantities of plums and figs are exported. Near by are hot sulphur springs, which have been frequented for centuries. Guimaraens is said to have been founded by Celts about 500 B. C. Henry of Burgundy made it the capital of Portugal in the beginning of the 12th century. Here began the reign of King Wamba, which is the proverbial expression for chronological indefiniteness.

GUINAND, a Swiss optician, born in the canton of Neuchâtel about 1745, died in 1825. He was the son of a house carpenter, and constructed a telescope in imitation of one of great value in the possession of his employer, so like the model that it was difficult to decide which of the two was better. At 40 years of age he commenced the manufacture of lenses for telescopes. Some of these coming under the observation of Fraunhofer, the well known instrument maker of Bavaria, he engaged the services of Guinand for a number of years, solely for his skill in this manufacture. In the latter part of his life Guinand was occupied in constructing telescopes of great size and power, every part of which was the work of his own hands. (See GLASS, and LENS.)

GUINEA, an English gold coin, first struck in the reign of Charles II., of gold which had been brought from the coast of Guinea, whence its name. Its value is 21 shillings, or about \$5 12. Guineas have not been coined since 1817, when they were superseded by the sovereign, and have now become rare.

GUINEA, a name applied to all the W. coast of Africa between Cape Verga, lat. $10^{\circ} 19' N.$, and Cape Negro, lat. $15^{\circ} 41' S.$; that part N. of Cape Lopez, about lat. $1^{\circ} S.$, being called Upper Guinea, and that S. of it Lower Guinea. Its coast line exceeds 3,500 m.; its breadth is indefinite, but it is considered to extend inland from 200 to 300 m. Upper Guinea, or Guinea proper, comprises the district of Sierra Leone, the Grain coast (including Liberia), the Ivory coast, the Gold coast (including Ashantee), the Slave coast (including Dahomey), Benin, Yoruba, Biafra, and several other small native kingdoms. From Cape Lopez the coast line runs nearly N., but bends gradually W. to Cape Formosa, forming the bight of Biafra, in which are the islands of Fernando Po, Prince, and St. Thomas. From Cape Formosa to Cape Palmas the coast trends westward, forming the bight of Benin in its course; and beyond Cape Palmas it has a general N. W. direction to Cape Verga. The waters between Capes Lopez and Palmas are called collectively the gulf of Guinea. Near Sierra Leone are high promontories and abrupt headlands clothed with tropical verdure. Cape Palmas receives its name from the immense palm groves which cover the undulating plains extending from it far inland. The Gold coast is rocky and bold, but not high, and at Accra becomes flat and sandy. Along the Slave coast are extensive salt marshes and lagoons, with outlying sand banks, and inland grassy plains which are converted into swamps in the rainy season. Near the equator, where the hills approach the sea, mountain scenery and tropical luxuriance greet the eye. From the latitude of Sierra Leone to the Quorra river extend the Kong mountains, nearly parallel to the coast and at a distance from it of from 100 to 300 m.; and from the shores of the bight of Biafra rise the Cameroons mountains, which extend far eastward. Numerous rivers drain this slope into the Atlantic, the chief of which are the Scarcios, Sierra Leone, Gallinas, Cape Mount, St. Paul's, Cavalla, Assinie, Tenda, Bossum Prah, Volta, Quorra or Joliba (ancient Niger), and its affluent the Tchadda, Old Calabar, Cameroons, Quaqua, and Gaboon. The climate is hot, oppressive, and insalubrious. At Cape Coast Castle the mean temperature during the hottest month is from 85° to $90^{\circ} F.$; at the Gaboon it is 84° . The heat is uniform and debilitating, and malarious fevers prevail wherever the coast is low. Tornados are common, and in December, January, and February, a dry N. E. wind, called the harmattan, fills the atmosphere with fine sand. The most valuable minerals are gold and iron, which are usually found in granitic or schistose rocks; gold is also obtained in the beds of some of the rivers. The interior is rich in virgin mines of the latter mineral. The forests, which cover a large proportion of the surface, abound in magnificent trees, among which are the baobab and the palm. Oranges, lemons, grapes,

pepper, sugar cane, cotton, indigo, tobacco, maize, millet, rice, yams, potatoes, various gums and dye woods, and ginger are among the other vegetable productions. The animals are cattle, of tough and ill-flavored flesh, sheep, horses, and goats (all of which are of poor breeds), elephants, buffaloes, jackals, tiger cats, hyaenas, leopards, deer, hares, porcupines, sloths, monkeys, lizards, rats, and mice. Cats and dogs have been introduced from Europe; the latter speedily degenerate, but are valued as food by the natives. Pheasants, partridges, snipes, turtle doves, birds of beautiful plumage, serpents, scorpions, centipedes, toads, frogs, locusts, and crocodiles are numerous; and the coasts abound with excellent fish, and are rich in coral and ambergris. The natives are divided into numerous tribes, the principal of which are the Mandingoes, Fantees, Ashantees, Dahomans, Egbas, Benins, and Fans. The Mandingoes claim to be Mohammedans; the others are pagans. All have a general resemblance in physical characteristics and customs. When the slave trade was the most flourishing branch of commerce on the coast, the chief occupation of most of these tribes was war for the sake of procuring captives to sell to the traders. The principal European settlements are Sierra Leone, the American colony of Liberia, the British Gold Coast colony, and the British settlement of Lagos and its dependencies. The French trading stations have recently been abandoned, and the Danish and Dutch forts on the Gold coast have been ceded to Great Britain. The French settlement at the Gaboon is now reduced to a mere coaling station. St. Thomas and Prince islands, in the gulf of Guinea, belong to Portugal; Fernando Po, Corisco, and Annabon to Spain. The most important articles of barter imported into Upper Guinea are lead, iron, firearms, gunpowder, cotton and woollen goods, brass vessels, salt, spirits, tobacco, and beads, which are exchanged for valuable woods, ginger, pepper, gums, rice, gold, palm oil and kernels, ground nuts, ivory, and wax.—Lower Guinea, extending from Cape Lopez to Cape Negro, comprises Loango, Congo, Angola, and Benguela. Its coast line follows a general N. N. W. direction, and is unbroken by any important indentation. It is traversed from N. to S. by a range of mountains, called by the Portuguese the Crystal or Salt mountains, which are covered with dense forests. The principal rivers are the Okanda or Ogobai, Zaire or Congo, Coanza, and Cuvo. Congo, Angola, and Benguela are claimed by the Portuguese, who have their capital at St. Paul de Loanda.—The Guinea coast was discovered by the Portuguese in 1487. A tribe called Genahoa, N. of the Senegal, are said to have been the first blacks encountered by them; and afterward the name was applied indiscriminately to all the peoples further south.—For a fuller description of the country, see the articles on its various divisions.

GUINEA, Gulf of, that part of the Atlantic which washes the shores of Upper Guinea between Capes Palmas and Lopez, including the bights of Benin and Biafra. It receives the rivers Assinie, Tenda, Bossum Prah, Volta, Quorra or Niger, Old Calabar, Cameroons, Quaqua, Gaboon, and many smaller streams, and contains Fernando Po, Prince, and St. Thomas islands. It has two currents, one setting eastward from Cape Palmas and the other coming from the south; they meet in the bight of Biafra and unite in one gradually expanding stream, which flows thence N. W., W., and S. W.

GUINEA FOWL, or *Pintado*, a gallinaceous bird, of the turkey family, and genus *numida* (Linn.), characterized by a moderate bill, with arched culmen and upper mandible overhanging the lower, and lateral margins smooth and curved; nostrils large, oval, and partly covered by a membrane; wings moderate, with the fifth quill longest; tail short and pendent; tarsi longer than middle toe, without spurs, covered in front with broad divided scales; toes moderate, the anterior united at their base by a



Guinea Fowl (*Numida meleagris*).

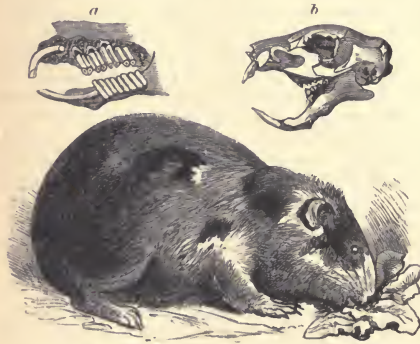
membrane, the hind toe short and elevated; claws short and very slightly curved. There are five species described by Gray, all of which have the head more or less naked, with fleshy caruncles below the bill, and some with a callos crest; the neck is long and slender, the body stout, and the feathers of the rump have an inflated appearance. They are peculiar to Africa, where they frequent woods on the banks of rivers in flocks of 200 or 300, scattering in search of food, which consists of grains, grasshoppers, ants, and other insects; when alarmed, they attempt to escape by running rather than flight; the eggs are numerous, and laid in a slight nest in a bush or thicket. The common Guinea or pea fowl (*N. meleagris*, Linn.) is slate-colored, covered all over with rounded white spots, and is about the size of the domestic cock. It was well known to the ancients, by whom it was domesticated for the sake of its flesh, and who named it *meleagris*. Guinea fowls are very noisy and troublesome, always quarrelling with the other inmates of the poultry yard; they are hard to raise, from the delicacy of the young and their liability to

disease; their flesh is of fine flavor, and their eggs are excellent. They are not profitable to the farmer, are great eaters, requiring to be fed beyond what they can pick up by themselves, and are apt to injure tender buds and flowers. One male suffices for 10 females; they lay in May or June 16 to 24 eggs, with a hard shell, of a yellowish white color with small brown points; they are poor sitters and not very tender mothers; incubation lasts three weeks, and is best performed by the common hen. The crested pintado (*N. cristata*, Pall.) has a crest of black feathers, and the body black with blue spots; the mitred pintado (*N. mitrata*, Pall.) has the head surmounted by a conical helmet, and is black, white spotted. Both these species have the same habits as the first, and could be as easily domesticated.

GUINEA GRASS, a name which, as well as Guinea corn, is applied in the southern states to *sorghum cernuum*, a grass closely related to broom corn; but instead of having an erect panicle like that, its flower clusters are nodding. Like many other plants that have been introduced into cultivation and abandoned when found valueless, this remains, where the climate is favorable to it, as a weed. It gives an acceptable forage in the West Indies and parts of Florida, where better grasses do not succeed.

GUINEA PIG, a South American rodent, of the subfamily *caviina*, and genus *cavia* (Klein). It will be seen that the common name conveys two erroneous impressions, as the animal is not found in Guinea, nor is it a pig; the term Guinea is doubtless a corruption of Guiana, and the name pig derived from the grunting noise made by it when hungry. The wild Guinea pig, or restless cavy (*C. aperea*, Linn.), is about 10 in. long, with a thick heavy body; short, wide, erect, and transparent ears; large, prominent eyes; head and snout like those of a rabbit, with white incisors; short neck and legs; four toes before, and three behind, unconnected by any membrane; and a long, rather coarse fur. The colors are black and dirty yellow above and on the sides in distinct pencils, the former prevailing on the back and upper surface of the head, the general tint being a dark grayish brown; the throat and abdomen a dirty yellow. The characters in the subfamily have been given in the article *CAVY*. The distinguishing characters from the subgenus *cerodon* are the larger size of the hind lobes of the molars, these lobes in the upper teeth having an indenting fold of enamel on the outer side, and the corresponding half of the lower with its deep fold on the inner side. It is found from about lat. 35° S. through Paraguay, Bolivia, Brazil, and perhaps as far N. as Guiana. Its food is entirely vegetable, and its time of feeding toward evening; it prefers marshy places covered with aquatic plants; it generally lives in societies of from 6 to 15 individuals, and its presence may often be detected by the beaten paths among the plants; it breeds only once a year, and has one or two young at a birth. The

restless cavy is generally believed to be the animal from which the domestic Guinea pig (*C. cobaya*) originated; but Mr. Waterhouse thinks it more probable that a pretty variety, such as may occur in all wild animals, attracted the attention of Europeans, who captured and domesticated it for its harmless disposition as well as its beauty, and by care perpetuated the race of the common Guinea pig. The animal is known by its black, white, and fulvous patches, irregularly distributed, and its short, close, and shining hair. It is exceedingly gentle in disposition, never attempting to defend itself by teeth or nails, simply making very slight efforts to escape, and uttering a sharp cry. Its remarkable fecundity alone preserves it from extinction; it is capable of fecundation at the age of six or eight weeks, and brings forth after three weeks' gestation from four to twelve at a birth, according to the age of the mother, who reaches her full development in nine months; lactation lasts about 15 days, and the female is ready for another fecundation;



Guinea Pig (*Cavia cobaya*). a. Teeth. b. Skull.

the young are born covered with fur, and with the eyes open. They are very sensitive to cold and damp; the flesh is not eaten, and the skin is useless, the only reasons for keeping them being their gentleness and beauty; there is a popular belief that their odor drives away rats. Their food is entirely vegetable, and they drink but seldom and by lapping; they will eat the usual green food of rabbits, but prefer parsley and carrot tops to the bread, milk, and meal upon which they are generally fed; they are fond of apples and other fruits, and remarkably so of tea leaves. Though cleanly in their habits, they have a disagreeable odor; like hares, they sleep with their eyes half open. Scarcely any two animals can be found with the same markings; the dark tortoise-shell ones are the most highly prized.

GUINEA WORM. See *ENTOZOA*, genus *filaria*, vol. vi., p. 670.

GUIPÚZCOA, one of the Basque provinces of Spain, bordering on the bay of Biscay, France, and the provinces of Navarre, Álava, and Biscay; area, 728 sq. m.; pop. in 1870, 180,743.

The coast is indented with numerous harbors. The principal rivers, all of which are small, are the Deva, Urola, Oria, and Bidassoa. The surface is an alternation of mountain, hill, and valley, and the scenery is highly romantic and picturesque. The climate is humid, mild, agreeable, and healthful. From the mountainous nature of the country, however, agriculture is prosecuted with difficulty. The chief minerals are iron, argentiferous lead, copper, marble, and gypsum. The province is traversed by a railway which passes through Tolosa. The principal manufactures are of iron. The inhabitants are honest, industrious, and brave. (See *BASQUES*.) The chief towns are St. Sebastian, the capital, Irun, Tolosa, and Fuenterabia. The Pheasants' island in the Bidassoa is celebrated as the place where the peace of the Pyrenees was concluded in 1659 between France and Spain.

GUISCARD, Robert, the founder of the kingdom of Naples, born about 1015, died July 17, 1085. His father, Tancred de Hauteville, a petty Norman baron, had twelve sons, of whom Robert was the sixth. As the paternal estate was insufficient to support so large a family, the three eldest sons went to Italy, where they secured rich possessions in the Norman colony of Apulia, of which they eventually became the leading nobles. Attracted by their success, the younger brothers also went to Italy, and Robert, who was surnamed Guiscard, the prudent or adroit, showed so much valor and address that on the death of his brother Humphrey in 1057 he was proclaimed count of Apulia, to the exclusion of the young son of the latter. He soon after overran Calabria, and received from Pope Nicholas II. the title of duke of both provinces, with the additional grant of whatever portions of Italy or Sicily he could wrest from the Greek schismatics or the Saracens. With the aid of his younger brother Roger he conquered Sicily, and ejected the Saracens from their remaining possessions in southern Italy. The kingdom of Naples had its origin in these conquests. Robert, having subsequently undertaken to annex the duchy of Benevento to his dominions, was brought into collision with Pope Gregory VII., who claimed the territory as a grant from the emperor of Germany. The pope excommunicated him, but a reconciliation was soon effected. In 1081, under the pretext of sustaining the rights of Constantine, son of the dethroned emperor Michael VII., who had married his daughter, he invaded Epirus and other provinces of the Byzantine empire, and after a series of victories was in full march for Constantinople, when he was recalled to Italy to relieve the pope, who was besieged by the emperor Henry IV. in the castle of Sant' Angelo. At Guiscard's approach Henry drew off his forces; but the populace having refused to receive the Normans, Rome was sacked by them, and a large portion of it burned. The pope, fearing to remain in the city, followed his

liberator to Salerno, where he died soon after. Guiscard immediately sailed with a large fleet for the Grecian archipelago, but died of an epidemic disease at Cephalonia on the eve of his departure for Constantinople.

GUISCHARD, or **Guisehardt**, **Karl Gottlieb**, a German writer, born in Magdeburg in 1724, died in Berlin, May 15, 1775. He studied at Halle, Marburg, and Leyden, with the intention of becoming a clergyman; but changing his mind, he entered the military service of Holland. After a single campaign, in which he served as ensign in an infantry regiment, peace having been restored by the treaty of Aix-la-Chapelle, he devoted himself to research upon military art in ancient times, and published in 1758 at the Hague his *Mémoires militaires sur les Grecs et les Romains*. Frederick the Great summoned the author to Breslau, bestowed upon him the name of Quintus Iulius by which he was afterward known, and gave him a major's commission. In this capacity Guiscard was called into service in Saxony, where he was charged with extortion. The king nevertheless promoted him to a colonelcy in 1763, and continued to treat him with favor. In 1773 he published at Berlin his *Mémoires historiques et critiques sur plusieurs points d'art militaire*, which he dedicated to Frederick. This work is written with clearness and a thorough knowledge of the subject.

GUISE, a town of France, in the department of Aisne, on the Oise, 23 m. N. of Laon; pop. in 1866, 5,099. It is a fortified place of the third class; has various manufactures and a phalanstery designed for 400 families. It is the birthplace of Camille Desmoulins. It is first mentioned in the 11th century. From it the dukes of Guise derived their title.

GUISE, House of, a branch of the ducal family of Lorraine, which played a conspicuous part in the religious and civil wars of France in the 16th century. Its most celebrated members were the following. **I. Claude de Lorraine**, first duke of Guise, born Oct. 20, 1496, died in April, 1550. He was a younger son of René, duke of Lorraine, whom he succeeded as count of Aumale. He established himself in France, where he rendered distinguished service to Francis I., who erected the former countship of Guise into a duchy, which he bestowed upon him, together with the government of Champagne. His daughter Marie married James V. of Scotland, and was mother of Mary queen of Scots. **II. François de Lorraine**, second duke of Guise, born at the castle of Bar, Feb. 17, 1519, died Feb. 24, 1563. Almost from the outset of his career he was distinguished as a good general and a brave soldier; and by his successful defence of the city of Metz (1552-'3), when he obliged Charles V. to raise the siege after having lost 30,000 men, he became renowned throughout Europe. He also signalized himself at the battle of Renti in 1554. At the request of Pope Paul IV. he was sent to Naples at the head of a French army

in 1556; but he failed in this undertaking. Montmorency having lost the battle of St. Quentin (1557), the kingdom was in imminent danger; but Guise repelled the imperial troops, and retook Calais from the English, who had held it since 1347. On the accession of Francis II., in 1559, Guise seized the reins of government, and caused Antoine de Bourbon, king of Navarre, and the prince of Condé to be arrested, and the latter placed on trial for high treason; but the death of the king (1560) deprived him of his ascendancy. With the constable Montmorency and Marshal Saint-André he then formed a kind of triumvirate in order to control the course of the government and to oppose the Protestants. An assault in 1562 on a body of Huguenots by some of his servants and followers gave the signal for the wars which continued for more than 30 years. At the head of the Catholics, Guise took Rouen, and a little later won the victory of Dreux, where Montmorency fell into the hands of the Protestants, and Saint-André was killed. He had reached the height of his power when, during the siege of Orleans, he was treacherously shot, Feb. 18, 1563, by a Protestant, Poltrot de Mérey, and died a week after. He left a diary, which was printed in Michaud and Poujoulat's *Nouvelle collection de mémoires pour servir à l'histoire de France*. **III. Henri I. de Lorraine**, third duke of Guise, son of the preceding, born Dec. 31, 1550, assassinated in Blois, Dec. 23, 1588. He witnessed his father's death, and swore vengeance against the Protestants, and especially Admiral Coligni, who he thought had instigated the deed. When 16 years old he went to Hungary and distinguished himself in the war against the Turks. After his return to France he fought at Jarnac and Moncontour, and forced Coligni to raise the siege of Poitiers in 1569. He was an abettor of the massacre of St. Bartholomew's day (1572), and was present when Coligni was killed. In 1575, having been wounded in the face in a successful encounter in the vicinity of Château-Thierry, he received the surname of *le Balafre*, the scarred, by which he was afterward commonly known. The following year he was instrumental in the formation of the "holy league" for the protection of the Catholics, of which till his death he was the head. After the death of the duke of Anjou, in 1584, he covertly aspired to the throne; and being supported by the pope and Philip II. of Spain, he excited the nation against Henry III. and his heir apparent Henry of Navarre. During the "war of the three Henries" he twice defeated, at Vimory and Aulneau, the German troops which had been enlisted in aid of the Huguenots. Notwithstanding the prohibition of Henry III., he entered Paris in triumph, besieged the king in the Louvre, May 12, 1588, during the popular rebellion known as the "day of the barricades," and remained the undisputed master of the capital. At the end of the same year he was present at the meeting of the states gen-

eral at Blois, and demanded to be appointed high constable and general-in-chief of the kingdom. The royal authority was placed in the utmost danger, when Henry caused Guise to be assassinated by some of the royal body guard. The duke's brother, the cardinal of Guise, who had participated in all his plans, was privately despatched in the following night.

IV. Charles de Lorraine, fourth duke of Guise, son of the preceding, born in 1571, died in 1640. After the assassination of his father he was imprisoned at Tours, whence he escaped in 1591, and went to Paris. In the intrigues of the league he took part against the duke of Mayenne. The estates of Paris were at one time disposed to marry him to a Spanish infanta, and raise him to the throne. Subsequently he went over to Henry IV., who made him governor of Provence. Under Louis XIII. he joined the party of Maria de' Medici, and was obliged to take refuge in Italy, where he died.

V. Henri II. de Lorraine, fifth duke of Guise, son of the preceding, born in Blois, April 4, 1614, died June 2, 1664. Being a younger son, he first entered the church; at 12 he possessed nine abbeys; at 15 he was promoted to the archbishopric of Rheims; but on the death of his elder brother he gave up a profession ill suited to his character, and when his father died in 1640 he was put in possession of the title of duke of Guise. His many follies and love adventures gave him notoriety. He meanwhile took part with the opponents of Richelieu, was sentenced to death in 1641, and fled to Belgium, where he married the countess of Bossut. After the death of Louis XIII. he returned to France, and indulged in every excess, distinguishing himself occasionally in battle by his bravery. About this time he fell in love with a Mlle. de Pons, and in order to bring about his union with her he went to Rome to solicit the dissolution of his former marriage. While there, hearing of the revolt in Naples under Masaniello, he resolved to conquer a throne which he could offer to his mistress. At the head of 20 followers, he left Rome Dec. 13, 1647, embarked on a felucca, and landed at Naples amid the applause of the population; but his overbearing manner soon disgusted the Neapolitans, who deserted him and delivered their city into the hands of the Spaniards. He was taken prisoner, April 6, 1648, carried to Spain, and kept in confinement till 1652. In 1654, with the help of the French government, he sailed again for Naples, but entirely failed in his enterprise. Returning to France, he was appointed grand chamberlain, and passed the rest of his life at the court. A narrative of his first expedition to Naples was published by his secretary, Sainctyon, under the title of *Mémoires de feu M. le duc de Guise, contenant son entreprise sur le royaume de Naples jusqu'à sa prison* (4to, 1668).

VI. Louis Joseph de Lorraine, sixth and last duke of Guise, nephew of the preceding, born in 1630, died in 1671. He succeeded his uncle in 1664,

and married the daughter of Gaston, duke of Orleans. He died childless, and the title and estates of Guise passed to Marie de Lorraine, daughter of the fourth duke, who died in 1688 without having been married. **VII. Louis de Lorraine**, cardinal de Guise, brother of le Balafré, born at Dampierre in 1555, assassinated at Blois, Dec. 24, 1588. He became archbishop of Rheims in 1574, and cardinal in 1578. He played a prominent part in the intrigues of the league, and made himself especially odious to Henry III. At the states general of Blois, in 1588, he presided over the clergy, found fault with the king's speech, and forced him to alter several passages. He was assassinated by order of the king. **VIII. Louis de Lorraine**, cardinal de Guise, nephew of the fifth duke, born about 1580, died in 1621. He entered the church, although his inclination was for a military career, and in 1615 became archbishop of Rheims and cardinal. In 1621 he accompanied the king in an expedition to Poitou, where he died. By Charlotte des Essarts, one of the mistresses of Henry IV., he had five children. It is said that he was secretly married to her, and that among his papers was found a dispensation from the pope granting permission for the marriage.

GUITAR (Gr. *κithára*; Span. *guitarra*), a musical stringed instrument, chiefly used to accompany the voice. It was known to the Egyptians in a form somewhat similar to that in present use for more than 15 centuries before the Christian era, and was probably introduced into Europe in modern times by the Spaniards, who derived it from the Moors. The Spanish guitar consists of a hollow wooden body of a somewhat oval form, about 18 in. in length by 4 in depth, and of a neck of 16 in., having a finger board with 17 frets. The strings, six in number, generally tuned E, A, D, G, B, E, are distended along the instrument, passing over a bridge at the lower end of the body, and being regulated by pegs at the upper end of the neck. They are set in vibration by the fingers of the right hand, while the left is employed to produce the modulations of tone by pressing against the frets on the finger board.

GUIZOT. **I. François Pierre Guillaume**, a French statesman and historian, born in Nîmes, Oct. 4, 1787. His father, a Calvinist and a distinguished lawyer, having died on the scaffold in 1794, he was taken by his mother to Geneva, where he received a classical education. In 1805 he went to Paris with a view to the study of law, but soon became engrossed in literary pursuits. He began to contribute largely to journals and periodicals, and exhibited a strength and maturity of intellect which soon brought him into notice. In 1809 he published his first work, entitled *Nouveau dictionnaire des synonymes français* (2 vols. 8vo), which was followed by *Annales de l'éducation, De l'état des beaux arts en France et du salon de 1810*, an annotated translation (from various pens) of Gibbon's "Decline and

Fall of the Roman Empire," *Vies des poètes français du siècle de Louis XIV.*, &c. In 1812 he was appointed assistant professor of modern history in the Sorbonne. In the same year he married Mlle. Pauline de Meulan, whose relations with the royalist party opened for him a political career, on which he entered at the fall of Napoleon. He was appointed secretary general of the department of the interior in 1814, of justice in 1815, master of requests in 1816, and councillor of state in 1817. He upheld the principles of the constitutional party by his political essay *Du gouvernement représentatif et de l'état actuel de la France* (1816), and thus became the mouthpiece of those who at a later period were known under the name of *doctrinaires*. Under the semi-liberal Decazes ministry he was director general of the communal and departmental administration, which post he resigned in February, 1820, on the fall of that cabinet. He now published his political pamphlet, *Du gouvernement de la France depuis la restauration et du ministère actuel*; and the following year, *Des moyens de gouvernement et d'opposition dans l'état actuel de la France* (1821). His strictures on the government were followed by his removal from the council of state, and ultimately he was ordered to discontinue his lectures in the Sorbonne, which he had published previously under the title of *Histoire du gouvernement représentatif* (1821-'2). He then devoted his time to literary pursuits, producing in succession a remarkable introduction to a revised French translation of the works of Shakespeare; *Essais sur l'histoire de France du cinquième au dixième siècle* (1823), an appendix to Mably's *Observations*; biographical sketches and historical notes to the *Collection des mémoires relatifs à la révolution d'Angleterre* (26 vols., 1823 et seq.), translated from the English by various writers, and to the *Collection des mémoires relatifs à l'histoire de France*, from its origin to the 13th century (31 vols., 1823 et seq.); the first two volumes of his *Histoire de la révolution d'Angleterre*, to the accession of Charles II. (1827-'8); and several essays and papers in periodicals. In January, 1828, he established the *Revue Française*, which was published every two months, nearly on the plan of the English quarterlies. In 1827 he lost his wife, and in the following year he married her niece, Mlle. Élisabeth Dillon, who lived only till 1833. In 1828 the Martignac ministry restored to him his chair at the Sorbonne and his seat in the council of state; and his eloquent lectures, which were delivered in conjunction with those of Cousin and Villemain, raised him to the highest popularity. They were published under the titles *Histoire générale de la civilisation en Europe depuis la chute de l'empire romain jusqu'à la révolution française* (1828), and *Histoire générale de la civilisation en France depuis la chute de l'empire romain* (1830). He entered the chamber of deputies in January,

1830, taking his place among the opposition, bore a part in the parliamentary proceedings which brought about the revolution of July, and was minister of the interior in the first cabinet of Louis Philippe. He resumed his seat in the chamber of deputies on Nov. 3, opposed the Lafitte cabinet, and supported that headed by Casimir Périer. After the death of the latter he entered the coalition ministry formed Oct. 11, 1832, under the presidency of Marshal Soult, in which he was minister of public instruction. After the dissolution of that ministry, Feb. 22, 1836, Guizot remained in comparative retirement for a few months. He resumed his post in the Molé cabinet, but soon quarrelled with his colleagues, resigned office, and joined the opposition. After the fall of Molé he was appointed ambassador to Great Britain, Feb. 9, 1840, being the first Protestant ambassador sent to that country by France since the time of Sully. He was recalled in October to succeed M. Thiers in the ministry of foreign affairs, in the last cabinet of Louis Philippe's reign. For more than seven years, in concert with the king, he upheld the system of peace at any price abroad, and of opposition to democratic reform at home, which eventually resulted in the overthrow of the Orleans dynasty. He succeeded in restoring the French government to a participation in the settlement of the eastern question, but the subordinate position in which England and Russia held France, and which the latter apparently did not resent, aroused a discontent that was not allayed by victories won in Algeria. Meanwhile the agitation for electoral reform was beginning in Paris, and propagating itself over the country. Guizot, who in 1847 had succeeded Soult as head of the ministry, evinced his contempt for what he considered a trifling matter, and reluctantly consented to resign his office, Feb. 23, 1848, when the revolution had actually commenced. He fled to England, where he published, in January, 1849, a pamphlet entitled *De la démocratie en France*. He returned after an absence of about a year, and was defeated in Calvados as a candidate for the chamber of deputies. In 1861 he declared himself in favor of the maintenance of the temporal power of the pope, which gave rise to much discussion both in France and in England. In 1870 he supported the ministry of Ollivier, and declared himself in favor of an affirmative vote on the *plébiscite*. Guizot is a member of three departments of the French institute, having been elected to the academy of moral and political sciences in 1832, to that of inscriptions and belles-lettres in 1833, and to the French academy in 1836. In 1872 he received from the academy the biennial prize of 20,000 francs. In the same year he resigned his membership in the Protestant synod. In March, 1874, he objected to Ollivier's panegyric of Napoleon III. in the academy; and subsequently hearing that the latter had paid his son's debts, he insisted upon refunding the

amount, and for that purpose sold for 120,000 francs a famous picture of Murillo which the queen of Spain had given him. His principal works, besides those already mentioned, are: *Monk: Chute de la république et rétablissement de la monarchie en Angleterre en 1660* (1850); *Corneille et son temps, and Shakspeare et son temps* (1852); *Histoire de la république d'Angleterre et du protectorat de Cromwell* (2 vols., 1854); *Histoire du protectorat de Richard Cromwell et du rétablissement des Stuarts* (2 vols., 1856); *Sir Robert Peel: Etude d'histoire contemporaine* (1856); *Mémoires pour servir à l'histoire de mon temps* (8 vols., 1858-'68); *L'Eglise et la société chrétienne en 1861* (1861); *Discours académiques* (1861); *Histoire parlementaire de France, &c.* (a collection of his speeches, 5 vols., 1863); *Méditations sur l'essence de la religion chrétienne* (1864); *Méditations sur l'état actuel de la religion chrétienne* (1865); *Mélanges biographiques et littéraires* (1868); *La France et la Prusse responsables devant l'Europe* (1868); *Histoire de France depuis les temps les plus reculés jusqu'en 1789, racontée à mes petits-enfants* (1870 et seq.); *Histoire de quatre grands chrétiens français* (2 vols., 1873-'4). For many years he has been writing a history of Spain, to be completed in 10 vols., of which 5 are now (1874) finished. He began to learn Spanish for this work at the age of 72. Among his editorial prefaces and memoirs, his admirable *Etude sur Washington*, prefixed originally to the *Vie, correspondance et écrits de Washington*, is particularly worthy of mention. Almost all his works have been translated into English, and all the more important ones into several other languages. **II.** *Elisabeth Charlotte Pauline de Menlan*, a French authoress, first wife of the preceding, born in Paris, Nov. 2, 1773, died there, Aug. 1, 1827. Her family was left in reduced circumstances by the death of her father in 1790, and she devoted herself to literature for support. In 1800 she published *Les contradictions*, a novel, and soon after *La chapelle d'Ayton*, partly an adaptation from the English. In 1801 she undertook the literary and artistic editorship of *Le Publiciste*, a periodical established by Suard. In 1807, being compelled to abandon her labors by ill health, she accepted the aid of an anonymous writer, who proved to be Guizot, then young and unknown. The intimacy arising from this incident ripened into love and ended in their marriage, April 12, 1812. Thenceforth she devoted herself principally to works for the moral improvement of the young, and published successively *Les enfants* (1812); *Le journal d'une mère* (1813); *L'Ecolier, ou Raoul et Victor* (1821), to which the academy awarded the Montyon prize; *Nouveaux contes à l'usage de la jeunesse* (1823); and *Lettres de famille sur l'éducation* (1826), which also gained a prize. Several volumes of her essays and tales were published by her husband after her death. **III.** *Marguerite An-*

drée Elisa (DILLON), niece of the preceding and second wife of François Guizot, born in Paris in 1804, died in 1833. She also cultivated letters, and furnished to the *Revue Française* a number of articles and tales, which were collected in a volume and published in 1834. Of her children, HENRIETTE, born in 1829, wife of Conrad de Witt, has published *Edouard III. et les bourgeois de Calais, ou les Anglais en France* (1854), *Une famille à Paris* (1863), and several books for children, and has translated a number of English works, including the life of Prince Albert, attributed to Queen Victoria, "China and Japan," by Laurence Oliphant, and "William Pitt and his Times," by Lord Stanhope. PAULINE, born in 1831, wife of Cornelius de Witt, brother of her sister's husband, wrote *Guillaume le Conquérant, ou l'Angleterre sous les Normands* (1854), and made translations from the English, including novels by Dickens and Miss Mulock, and, in collaboration with her sister, Motley's "Rise of the Dutch Republic." She died at Cannes, Feb. 28, 1874. MAURICE GUILLAUME, the only son, born in Paris, Jan. 11, 1833, received a prize from the French academy in 1853, for a work entitled *Ménandre, étude historique et littéraire sur la comédie et la société grecques* (1855). In 1866 he was appointed professor of the French language and literature in the collège de France. He has also published *Alfred le Grand, ou l'Angleterre sous les Anglo-Saxons* (1856), and translations of Macaulay's essays.

GUJERAT. See GUZERAT.

GULF WEED. See ATLANTIC OCEAN, vol. ii., p. 79.

GULL, a web-footed bird, comprising several genera of the family *larida*, of which the typical genus *larus* (Linn.) is found over the marine portions of the entire world. The bill varies considerably in form and strength, though it is generally straight, with compressed sides, and curved at the end; nostrils lateral and oblong; wings long and pointed; tail usually even; tarsi robust; anterior toes united by a full web, and the hind toe short and elevated. The genus *larus* contains the largest and best known of the gulls, characterized by a strong hooked bill, nearly even tail, light-colored mantle, and white head. The largest of the gulls is the glaucous or burgomaster (*L. glaucus*, Brinnich), 30 in. long, with an alar extent of 5 ft.; the bill about 3 in., very stout, gamboge yellow, with a reddish orange patch near the end of the lower mandible; the general color is pure white, with a light grayish blue tinge on the back and wings. It is an inhabitant of the arctic seas, coming down in winter as far as New York. It is exceedingly shy, and notoriously voracious; eating fish, small birds, and carrion; it is less noisy than most other species. The eggs are pale purplish gray, with spots of brown and purple. The young, as in gulls generally, are pale yellowish brown, with spots and bars of dusky. The black-backed gull (*L. marinus*,

Linn.) is about the size of the last, from which it may be distinguished by the dark slate color of its back and wings, the black white-tipped primaries, and the yellow legs and feet. It is found from the entrance of Baffin bay to Maine, its favorite breeding places being on



Black-backed Gull (*Larus marinus*).

the coast of Labrador; in winter it goes as far south as Florida. It is a high, powerful, and majestic flier, resembling in this respect, as well as in its voracious habits, the vultures; it breasts the fiercest gales, skimming along the tops of the waves; it is a good walker, a light but slow swimmer, and no diver. It preys upon fish, young birds, eggs, and any floating carrion; in fact, upon everything except vegetable food; tyrannical and strong, it



Silvery Gull (*Larus argentatus*).
1. Adult. 2. Young. 3. Bill.

is also very cowardly, flying off when the bold little skuas or jagers (*stercorarius*) attack or approach it. It is exceedingly shy, and very noisy in the breeding season; in captivity it is very long-lived. The breeding season is from the middle of May to the middle of June, and

only one brood is raised in a year; the nest, composed of weeds and grasses, is placed upon rocky shelves, and the eggs, usually three, are about 3 by 2 in., of a pale greenish gray, with dark spots and blotches; both sexes take part in incubation, and the young are fed at first by regurgitation. The eggs, like those of gulls generally, are good eating; great numbers of the young, when nearly able to fly, are killed and salted as food for the fishermen of Labrador and Newfoundland; the old birds are tough and unfit for food. The plumage is soft and thick, and is esteemed for pillows and similar articles. The herring or silvery gull (*L. argentatus*, Brunn.) is about 23 in. long, and 53 in alar extent; it resembles a small glaucous gull, except that the first six primaries are marked with black. This is a very shy species, with a powerful and graceful flight; it feeds principally on herring, and on the usual food of gulls. It is found from Newfoundland to Texas, and goes inland to the western rivers and northern lakes; it breeds from Labrador to Maine, nesting, when persecuted by man, on high trees; the eggs, about 3 by 2 in., are usually three, of a dull yellow color with spots and blotches of umber brown, and are excellent as food.—In the genus *chroicocephalus* (Eyton) the bill is moderate, slender, and much compressed; the size is small, and the head in the spring plumage has a dark hood, becoming white in winter; the contrast of black and white makes them very handsome birds. The laughing gull (*C. atricilla*, Linn.), 17 in. long, has the mantle and wings bluish gray, the hood dark leaden gray, and white lines on the lids; found from Massachusetts to Texas. Bonaparte's gull (*C. Bonapartei*, Rich.), about 15 in. long, has a light mantle, grayish black hood, and a white band divided by a narrow black line around the posterior part of the eye; it is found from Nova Scotia to Texas, on the western rivers and lakes, the Pacific coast, and in the fur countries; in the neighborhood of Puget's sound it is eaten by some Indian tribes.—In the genus *rissa* (Leach), including the kittiwakes, the bill is long but strong, and the hind toe rudimentary or very small. The three-toed gull, or kittiwake (*R. tridactylus*, Linn.), 17 in. long, has a pearl-gray mantle, the ends of the outer primaries black, and a general white plumage; it is found from Labrador and the fur countries to the southern coast in winter. There are three other species on the N. W. coast.—The ivory gull (*pagophila eburnea*, Gmel.), about 19 in. long, has an entirely white plumage, with an ivory yellow bill, dusky at the base; all the species of the genus are found far at sea in high northern latitudes, where they feed principally on the flesh and fat of cetacean animals. The larger and the arctic species, the former called goelands, are found also on the European continent. The common gull of Europe is the *L. canus* (Linn.). The larger terns, of similar appearance and habits but smaller size, are often called gulls.

GULL, Sir William Withy, an English physician, born at Thorpe-le-Soken, Essex, Dec. 31, 1816. He graduated M. D. at the university of London in 1846, was Fullerian professor of physiology at the royal institution in 1847-'9, and afterward physician to Guy's hospital till about 1867. He was knighted after his successful attendance during a severe illness of the prince of Wales in 1871, and appointed physician extraordinary. He is president of the clinical society. His publications include a lecture on paralysis and treatises on hypochondriasis and on abscess of the brain.

GUM, an exudation from certain trees, distinguished by its either softening or dissolving in water, and not yielding to alcohol; also by affording mucic acid, when acted upon by nitric acid. The resins, which resemble the gums in origin and appearance, are insoluble in water, but dissolve in alcohol, ether, and the essential oils, and are moreover distinguished from the gums by their inflammability. The gums, as they issue through the punctured bark of trees, are held in solution in the vegetable juices; and as these evaporate on exposure they form a thick adhesive substance, which by further exsiccation may become dry, hard, and pulverizable. They are mixtures of the calcium and potassium salts of a feeble vegetable acid termed gummic or arabic. By boiling down the juices or the infusions of many plants, a substance of this nature is often obtained, even when the plants are not known to produce it naturally. Flaxseed may thus yield a product, called bassorine, which when dried is like gum arabic. The gummy substances obtained in this way are generally distinguished by the name of mucilage. Though the gums differ in their chemical reactions from amylaceous matter, their elementary composition is usually considered the same, and like that of starch is represented by the formula $C_6H_{10}O_5$. Starch acquires the properties of gum when dried at a temperature of 266° F. (See DEXTRINE.) Gums possess little if any dietetic value, since experiment has shown that they merely dissolve or swell up in the intestinal fluids, without being changed to sugar, and are absorbed, if at all, only in an exceedingly small quantity. It is said, however, that gum arabic is used as food by some savage and semi-barbarous tribes; but reports of this character are hardly sufficient to set aside the data of exact experiment. Mucilaginous fluids are given to invalids as agreeable drinks, and are of benefit in sheathing inflamed surfaces and protecting them from irritation. It appears, however, from Dr. Hammond's experiments, that the insertion of large quantities of gum may irritate the mucous membrane of the bowels, and therefore it should not be administered too freely, especially to infants. Properly given, it is of use in dysentery, diarrhoea, and inflammation of the bowels, chest, and bladder. It may be advantageously added to diuretics.—Several varieties of gum are recognized, most of which may be re-

ferred to one or other of three divisions. Those of the first, distinguished by their solubility in water, are chiefly composed of the peculiar principle arabine, and are represented by gum arabic, the purest of the gums. The second division comprises those which soften and swell in water without dissolving, as gum tragacanth, Bassorah gum, &c. They are in great part composed of arabine, but also contain the principle bassorine. The third division includes those that are partially soluble in water, and are distinguished by the presence of the principle cerasine. The gums of the cherry and many other fruit trees belong to this group.—**GUM ARABIC** may be used as a generic name for the various gums produced by the several species of acacia, many of which are particularly designated by their localities, as the Turkey or Arabic gum, the Barbary or Morocco gum, Cape gum, East India gum, gum Senegal, &c. The first named is the product principally of the *acacia vera* and *A. Arabica*; it is collected mostly in Upper Egypt, Nubia, Kordofan, and Darfoor, and is brought from different parts of the Mediterranean. The second is supposed to be obtained from the *A. gummifera*, and is brought from Mogadore and Mazagan. The Cape gum is from the Cape of Good Hope, the product of a species of acacia resembling the *vera*, and named by Burchell the *capensis*. The East India gum, mostly from Bombay, is the product of different species of acacia. Gum Senegal, from Senegambia, is supposed to be obtained from *A. Senegal*, *A. vera*, *A. Seyal*, and *A. Adansonii*. The first named of these is a small tree which forms vast forests in the hottest regions of Africa. These varieties of gum arabic differ somewhat in purity, hardness, and color. The best real gum arabic is in rounded or amorphous tears, some of which are as large as nutmegs, some transparent, and some opaque, of light shades of yellow, sometimes red, also white, and of glassy lustre. The gum has a sweetish taste, but no decided odor. Its specific gravity varies from 1.3 to about 1.5. It is readily dissolved in boiling water; but the solution more slowly effected in cold water keeps better. It has an acid reaction, and alcohol added to it causes the gum to fall as a white precipitate. Gum arabic is used in the arts for producing a glazed surface upon fabrics, as also for stiffening or giving to them a body, answering the same purpose as starch. By increasing the density of liquids in which it dissolves, these are made to retain substances in suspension which would otherwise subside. It is for this purpose introduced into writing ink and various preparations of pigments and of medicines. It is also administered for its own medicinal qualities, which are chiefly of a demulcent character. It is not susceptible of fermentation under the influence of yeast, but if digested with cheese and chalk it may be made to furnish alcohol. Its nutritive property has already been noticed. The gum is often adulte-

rated with inferior gums, and also with starch and flour. Iodine readily detects the presence of starch or of flour in solutions of gum containing them by the blue color produced.—**GUM TRAGACANTH**, also called **GUM DRAGON**, is the product of various species of *astragalus*, especially the *A. verus* of the north of Persia, Armenia, and Asia Minor, and the *A. gummifer* of Arabia, Mt. Lebanon, &c. It is collected in the months of July and August from the natural exudations of the shrubs, and from those resulting from incisions made in the stem near the root. It is a hard, tough substance, more or less white according to its purity, in very irregular flattened shapes, and in tortuous vermicular filaments. It may be pulverized after drying at a temperature of 212°. It has no taste or smell. Its specific gravity is 1.384. It swells slowly in water, partially dissolving, and forms a thick adhesive paste. By boiling with sufficient water, a solution is obtained of similar appearance, and Brander thinks of the composition, of that of gum arabic. Different analyses are given of it, but that of Guérin-Varry is generally adopted; it is as follows: arabine, 53.3 per cent.; bassorine or tragacanthine, 33.1; water, 11.1; inorganic matter, 2.5. Starch is detected in very small quantity in the bassorine. From the ultimate analysis the same chemist deduced the formula $C_5H_{10}O_5$. The uses of gum tragacanth are similar to those of gum arabic. Apothecaries employ it to give adhesiveness to the ingredients of pills, and confectioners apply it with a similar object to the materials of lozenges. Gum of Bassorah, from Bassorah near the head of the Persian gulf, is of this class of gums, and furnishes the name for the peculiar principle they contain.—**CHERRY-TREE GUM**, including in this name the exudations of the peach, plum, and other kindred trees, is an inferior quality of gum, somewhat like gum arabic, and consisting of a portion soluble in cold water, which is arabine, and a portion insoluble, which is the principle named by M. Guérin-Varry cerasine. (For gum kino, see **KINO**).—**GUM MEZQUITE** is the product of the mezquite tree (*prosopis glandulosa*) of Texas and New Mexico, brought to notice in 1854 by Dr. Shumard of the United States army. It is described as similar in its properties to gum arabic, exuding spontaneously from the tree, and concreting into tears and lumps of variable sizes, semi-transparent, and of lemon white to dark amber shades of color. It is brittle and easily pulverized, and the fractured surfaces are brilliant. From an ounce to 3 lbs. has been obtained from a single tree, and more, no doubt, by making incisions in the bark. The branches furnish a purer quality than the trunk. The best time for collecting it is the latter part of August. The trees abound upon the plains over regions thousands of miles in extent, and flourish luxuriantly in dry and elevated situations. If the gum could be easily obtained in large quantities, it would become

an important commercial article; but an abundant exudation takes place only in unusually dry seasons after an interval of several years. Specimens have been analyzed by Dr. Campbell Morfit with the following results: arabine, 84.967; bassorine, 0.206; water, 11.640; inorganic matter, 3.000; impurities, 0.236; total, 100.049. Elementary composition: carbon, 44.706 per cent.; oxygen, 48.794; hydrogen, 6.500. It thus shows a close resemblance to gum arabic and gum Senegal in composition as well as in its physical and chemical properties. It is kept in the drug stores of the Mexican cities, and considerable quantities have been sent to San Francisco from the Mexican ports on the Pacific.—This country receives its supplies of gums in great part through England.

GUMBINNEN, a town of Prussia, capital of a district of the same name, in the province of East Prussia, on the Pissa, 68 m. E. of Königsberg; pop. in 1871, 9,085. The town, lying on both sides of the river, is regularly built, and contains three Protestant churches, a public library, a school of midwifery, a gymnasium, and two hospitals. It has manufactories of woollen and linen cloth and hosiery, beer, and liquors, and a considerable trade in corn and cattle. Gumbinnen owes its prosperity largely to the fact that it gave asylum to Protestants, chiefly from Salzburg, who fled thither from persecution about the year 1732. Previously it was but an insignificant village.

GUMBO, a southern name, probably derived from the negroes, of a stew or soup, usually made of chicken, and thickened with the mucilaginous pods of the okra. When these cannot be obtained, sassafras pith or tapioca is used as a substitute. (See **OKRA**.)

GUM RESINS, inspissated juices of certain plants, obtained by spontaneous exudation or from incisions purposely made. They consist of resin and gum, the proportions varying in the different varieties, and with these are commonly associated essential oil, and other vegetable substances, as starch, bassorine, extractive, &c. They are most of them hard and dry substances, brittle and opaque, rarely translucent like the resins. Some that are semiliquid and viscid, as the sagapenum and galbanum, become hard in very cold weather, and may then be pulverized. At a moderate heat these are sufficiently fluid to be strained through a cloth; and all the gum resins may be thus strained and purified by first boiling them in water. They are partially soluble in water or in alcohol, and wholly so in a mixture of these. In water alone the gum dissolved holds for a time the finely divided resinous portion suspended, and thus emulsions are prepared for administering the substances in medicine, which is their principal use. Balsams are distinguished from gum resins by containing benzoic acid. The most important gum resins are described in separate articles, as aloes, ammoniac, asafetida, bdellium, euphorbium, galbanum, gamboge, myrrh, sagapenum, scammony, &c.

GUM TREE. See BLACK GUM.

GUN. See CANNON, MUSKET, and RIFLE.

GUN COTTON, an explosive substance obtained by subjecting common cotton to the action of strong nitric acid, first brought to public notice in 1846 by Prof. Schönbein of Basel, Switzerland. Several products are known under this name, possessing distinct properties, though differing slightly in constitution. Cotton fibre is nearly pure cellulose, $C_{12}H_{10}O_{10}$, and by the action of the acid a number of equivalents of nitric oxide, N_2O_4 , or NO_2 , are substituted for an equal number of hydrogen. The number of equivalents substituted varies from 6 to 9, according to the strength of the acid. Thus, the substitution of 9 equivalents would give $C_{12}H_{21}(NO_2)_9O_{10}$, or more simply, $C_6H_7(NO_2)_9O_5$. Water is also generated in the reaction, by the union of hydrogen with the oxygen set free in reducing nitric acid to oxide. In preparing the gun cotton, two or three parts of strong sulphuric acid are mixed with one part of nitric acid, to absorb this water and thus prevent further hydration of the nitric acid. The following formulas show the constitution of the products obtained by using two or three parts of sulphuric acid and one of nitric acid, while the quantity of water is varied: 1. With monohydrated acids: $C_{12}H_{10}O_{10} + 9(HNO_3) = C_{12}H_{21}(NO_2)_9O_{10} + 9H_2O$. 2. With 3 to 4 parts water: $C_{12}H_{10}O_{10} + 8(HNO_3) = C_{12}H_{22}(NO_2)_8O_{10} + 8H_2O$. 3. With 4 to 5 parts water: $C_{12}H_{10}O_{10} + 7(HNO_3) = C_{12}H_{23}(NO_2)_7O_{10} + 7H_2O$. 4. With 5 to 6 parts water: $C_{12}H_{10}O_{10} + 6(HNO_3) = C_{12}H_{24}(NO_2)_6O_{10} + 6H_2O$. The first variety is the well known detonating gun cotton. It is insoluble in common ether and alcohol, and is not attacked by acetic acid, but is soluble in acetic ether. The second is a less explosive variety, soluble in common ether with one eighth of alcohol added, but insoluble in acetic acid. The third is inflammable, but not ordinarily explosive, and is soluble both in ether and in glacial acetic acid. This variety is used for collodion. The fourth is always dissolved in the acid, from which hitherto it has not been isolated. In the manufacture of gun cotton the substitutions are never exactly in accordance with the foregoing formulas, but most probably different degrees of substitution take place in the different molecules of the same mass of cotton; and a careful analysis shows invariably an intermediate constitution, though in many cases one of the typical constitutions is very closely approached. Gun cotton is not readily distinguishable in appearance from the unaltered cotton; but it is slightly harsher to the touch and the compression of the fingers. When moistened with a solution of iodine in potassium iodide, and touched with a drop of dilute sulphuric acid, it turns yellow, while unchanged cotton under the same test turns blue. The variety here to be considered is the detonating product, $C_6H_7(NO_2)_9O_5$. To prepare it the strongest commercial acids are required, the nitric acid having a density of near

1.50, and the sulphuric a density of 1.847. An immersion of the cotton for a few seconds yields an explosive material; but to insure the highest degree of explosiveness the immersion should be prolonged. Baron Lenk protracted it to 48 hours. On withdrawing it from the bath, as much acid as possible is squeezed out between porcelain plates, and the cotton is repeatedly and thoroughly washed in water. The fibres are capillary, and during the immersion the tubes absorb acid, which it is difficult to remove entirely. As the so-called spontaneous ignition of gun cotton has been frequently attributed to the retention of acid, the original method of washing the unbroken fibre in water has been abandoned, and a new mode of treatment, devised by Mr. F. A. Abel, has been extensively applied in England. The fibre is first subjected to two or three rinsings in a large volume of water, and is freed from water as far as possible after each rinsing, by a centrifugal drying machine. It is then reduced to pulp by an engine similar to that used in reducing paper pulp. The access of water to the capillary tubes is thus greatly facilitated, and to insure the most searching purification, the pulp is transferred to a "poaching machine," where it is beaten about, and kept suspended in a large volume of warm water, continuously renewed, and rendered slightly alkaline at the close of the operation. This operation lasts about 48 hours, and the quantity treated is half a ton. In this way a thorough intermixture of the products of many dippings is obtained, and the average constitution is rendered uniform. The pulp is then compacted into the desired forms by a preliminary moulding and a subsequent pressing by hydraulic power, ranging from four to six tons per square inch. On leaving the press the slab contains about 20 per cent. of water, in which condition it may be safely cut with circular or band saws, and even hot iron may be used without danger to burn holes in it. When wet it may be kept for an indefinite period without change, and, whether wet or dry, it is affected by very few reagents. Its stability is superior to that of gunpowder in every respect save the all-important one of immunity from inexplicable explosion. Repeated accidents have destroyed the confidence of all but the most sanguine in its safety. It was for a time supposed that the ingenious process of Mr. Abel had removed the causes of distrust; but a terrible and unexplained explosion at Stowmarket in 1871 revived the feeling, which still prevails. How far the repeated disasters attending the use and storage of gun cotton are due to the carelessness of those who have it in charge, is unknown, for it leaves no witnesses to testify to the origin of the explosions, and the very mystery which surrounds them, and our frequent inability even to conjecture a probable cause, are sufficient reasons for regarding it as a treacherous servant. If massive gun cotton be ignited by a coal or flame of low

intensity, it burns in the open air inexplorably. If ignited by a powerful flame, it flashes like gunpowder; but if ignited by a fulminate, it detonates with tremendous violence. This "sympathetic" quality, by virtue of which the total combustion seems to follow the character of the ignition, is difficult to explain, and also presents some anomalies. According to Mr. Abel, about five grains of fulminate of mercury is required to produce detonation; but ten times that quantity of chloride of nitrogen, strongly confined, is required to produce the same result, while 350 grains of nitro-glycerine, exploded in contact with massive gun cotton, fails to produce any other result than the mechanical disintegration of the mass. The rate at which detonation is propagated along a row of gun-cotton disks has been investigated by Mr. Abel and Capt. A. Noble, who found it to be about 18,000 feet a second. A sound wave would travel through such a mass with less than one fourth of this velocity, and such rapidity of transmission seems explicable only on the assumption that ignition is carried along the surface by the expanding gases, driven by their tension. The products of combustion of gun cotton vary with the conditions under which it is exploded. They consist of varying proportions of carbonic oxide, carbonic acid, marsh gas, nitric oxide, nitrogen, and water. Two analyses by Lieut. Von Károlyi of the Prussian army gave, by volume:

CONSTITUENTS.	I.	II.
Carbonic oxide	28.55	28.95
Carbonic acid	19.11	20.82
Marsh gas	11.17	7.24
Nitric oxide	8.58	.....
Nitrogen	8.56	12.67
Carbon	1.85	1.82
Aqueous vapor	21.98	25.84
Hydrogen .....	.....	8.16
Total	100.00	100.00

The first analysis is that of gases obtained by exploding the cotton *in vacuo*, and the second by exploding it in strong iron tubes placed in a mortar.—Many attempts have been made to substitute gun cotton for gunpowder in military operations. A brief examination of the phenomena of explosions will show that it can never be advantageously used as an agent for the propulsion of projectiles. In the explosion of all detonating compounds the conversion of the solid or liquid material into elastic gases is so rapid that it may be regarded as practically, though not strictly, instantaneous. The subsequent expansion of these gases by their elastic force must be the motive power of the shot; and at the instant of concussion this is so great, in the case of gun cotton confined in a small receptacle, that no material can withstand it, unless the chamber be much larger than the bulk of the gun cotton. If the explosive energy be reduced by using a large chamber, or by mixing the compound with some inert material, then the total elastic effort is no greater

than that of gunpowder. It can be rendered serviceable in this relation only by depriving it of the very excess of energy which can alone give greater velocity to a projectile; and there is no probability that any means can be employed to compensate for this loss of energy, as may be done with gunpowder. As a bursting charge for hollow projectiles, the destructive efficiency of gun cotton is very great; but experience has shown its extreme liability to explode prematurely by the shock of the discharge. Its detonation in contact with hard materials shatters or disintegrates them. Wood and rock are completely pulverized by it, while hollow projectiles are often blown into innumerable fragments. But these effects extend to a small distance only from the centre of explosion, and at the distance of a few feet the effect is no greater than that obtained from gunpowder.—The use of gun cotton in blasting is favored by its indifference to water, and by its great explosive effect, estimated by Combes and Flandin to be fourfold, by Séguier sixfold, and by Tamper double that of gunpowder. These estimates are based upon practical experiment. They indicate a saving in practice by the use of shallower bore holes. But the relative costliness of gun cotton, the danger of premature explosions in charging holes, its varying quality, its liability to spontaneous decomposition, and its too rapid combustion, which gives it a tendency to shatter or pulverize rather than lift and loosen the rock, have proved great obstacles to its use. Many of these objections have been obviated, it is asserted, by the manufacture of compound gun cotton above described, and by the admixture of less explosive or non-explosive substances, such as common cotton. Extensive and successful use was made of gun cotton in the quarries of Comorn and in the removal of the ancient walls of Vienna. In the former case, the cotton was wound in solid cylinders; in the latter the cylinders were hollow. Punshon, an English manufacturer, claims that he makes an article of definite explosive power in grades, suited to any use, the quality of each grade being uniform. He also asserts that his gun cotton preparations will not explode or decompose spontaneously, and can be stored or transported without danger. In these preparations, the gun cotton is coated with a powder of sugar, or potash or other salts, which separates the fibres. By changing the quality of this powder the desired grade of exploding force is obtained.—Bleekrode found that gun cotton, when moistened with an inflammable liquid, like carbon sulphide, ether, benzine, or alcohol, and ignited by the electric spark or otherwise, does not explode, but burns slowly. Hence he recommends that when stored it should be covered with such a liquid, which could be removed by evaporation. A new variety of gun cotton is made by immersing cotton for 15 minutes in a saturated solution of chlorate of potassa. It is chemically more allied appa-

rently to the chlorate of potassa powders. Little is known of its application. A new gun cotton, known as gadoxyline, is manufactured in Wolverhampton, England. Its composition is unknown. Gun cotton has been manufactured into an explosive paper, to reduce the danger of handling and charging.

GÜNDERODE, Karoline von, a German poetess, born in Carlsruhe, Feb. 11, 1780, committed suicide July 26, 1806. She became canoness of a chapter in Frankfort, and under the name of "Tian" wrote a number of poems remarkable for passionate feeling. She formed an attachment for the philologist Creuzer, which terminated unhappily, and led to her suicide. She was intimate with Bettina von Arnim, who published their correspondence under the title of *Die Günderode* (2 vols., Grünberg, 1840; translated by Margaret Fuller, Boston, 1842). Her literary remains consist of *Gedichte und Phantasien* (Hamburg, 1804), *Poetische Fragmente* (Frankfort, 1805), and *Gesammelte Dichtungen* (Mannheim, 1857).

GUNDUK, a river of Hindostan, which rises N. of the Himalaya mountains, and flows through that chain in a S. E. direction to Hajepoor, where it falls into the Ganges, in lat. $25^{\circ} 39' N.$, lon. $85^{\circ} 16' E.$ Its course is estimated at 400 m. The scenery where it emerges from the Himalaya range is magnificent. In the upper part of its course it is called Salgrami, from a singular species of stones found in its channel; they are mostly round, and are generally perforated in one or more places.

GUNDWANA. See GONDS.

GUNNEL. See BLENNY.

GUNNERY, the art of using guns, gunpowder, and projectiles. The forces which are of moment in gunnery as affecting the course of projectiles are terrestrial gravitation and the resistance of the air. The former is so nearly uniform, both in amount and direction, that it may be so regarded. But the difficulties which appear when we investigate the resistance of air are so formidable, that hitherto mathematicians have utterly failed to find a general formula, and have been obliged to resort to purely empirical methods. The first quantity to be sought is a unit of resistance with which all other degrees of resistance may be compared; and this is usually taken as the resistance offered by the air to a body having a front 1 foot square, moving 1 foot in 1 second. This quantity cannot be determined theoretically, but it is found by careful trial that the value of this unit depends upon the form of the front, as well as its area. It is also considerably influenced by the shape of the rear. Hutton has given the following ratios between the values of the resistance:

Hemisphere, convex side foremost	119
Sphere	124
Cone, point foremost, with a vertical angle of $28^{\circ} 42'$	126
Disk	285
Hemisphere, flat surface foremost	288
Cone, base foremost	291

In these ratios it appears that the resistance to the cone is about the same as that to a sphere, notwithstanding the sharp point of the former. From recent experiments by Prof. Bashforth of Woolwich, it also appears that the resistance to an elongated shot with a hemispherical front is less than that to a spherical shot of equal diameter, in the ratio of 1.345 to 1.531. Newton, in his *Principia*, gives as the front of least resistance a figure having nearly the section of a pointed Gothic arch. In practice it has been found that the "pointed ogive" or pointed Gothic arch gives less resistance than any other front hitherto experimented with. Investigators have therefore been compelled to determine the values of the unit independently for every kind of projectile in use. The dependence of resistance of air upon velocity is also determined experimentally. The latest and most trustworthy researches, by Prof. Francis Bashforth of the Woolwich artillery school, show that for velocities ranging from 1,400 to 1,700 ft. a second the resistance varies nearly as the square of the velocity; for those between 1,100 and 1,400 ft. it varies more nearly as the cube of the velocity; while for still lower velocities the ratio is in some power higher than the cube. Thus a 15-inch shot, moving 1,500 ft. a second, encounters a resistance amounting to nearly a ton and a half, while a 10-inch shot encounters about three fourths of a ton at the same velocity. The amount of resistance offered by the air, and many other important data in gunnery, are ascertained by measuring the velocity of a projectile in different parts of its path. This is accomplished by means of an electro-velocimeter. The projectile is made to break a series of electric circuits at several points, separated by equal intervals. The electric circuit passes through a machine, which contains a cylinder revolving at a known rate, and by appropriate devices the ruptures of the circuit make visible marks upon this cylinder. By measuring the distance between these marks, and multiplying it by the rate of revolution, the time which elapsed between any two instants of rupture becomes known.—Besides retardation, projectiles moving in air are subject to deviations resulting from their rotary motions about their axes. Spherical shot are always made of smaller diameter than the bore of the gun from which they are fired; the difference in the two diameters being termed windage. One of its consequences is, that spherical shot are subject to a series of rebounds from side to side or from top to bottom of the bore, which is called balloting, and which causes them to leave the bore with a rotary motion. Let us suppose, for instance, that at the last ballot (rebound) the shot strikes the right side of the bore, as in fig. 1, receiving a rotary motion in the direction indicated by the arrows. This motion, combined with the motion of translation, tends to augment the pressure of the opposing air in the direction A \bar{z} , and to diminish it in the di-

rection $A r$; and the result is the deflection of the path of the shot to the right. Hence the effect of the last ballot in the case supposed is, first, to throw the shot to the left, while the unequal pressure of the air gradually deflects it back again to the right. If the final ballot



FIG. 1.

were on the left side, the deflections would be reversed; if upon the top, the range would be slightly increased; and if upon the bottom, the range would be diminished. These effects were investigated, and the results demonstrated experimentally, by Magnus. They are much aggravated when, by reason of irregular density, the centre of gravity of a ball does not coincide with its centre of figure. They are greater in small than in large projectiles for three reasons:

1. The actual amount of windage is very nearly the same for all calibres, and hence is relatively less for larger calibres than for small ones; therefore the balloting and consequent rotation will be less.
2. Large projectiles can be made more nearly isotropic than small ones, and the centres of figure and of gravity are more nearly coincident.
3. The effects of resistance of air are very nearly proportional to the surface exposed, *i. e.*, to the square of the calibre; while the inertia of the shot and its consequent power to resist these effects is proportional to its mass, *i. e.*, to the cube of the calibre. No projectiles have less lateral deviation than the largest round shot, whether the range be long or short; but the deviations of small spherical shot are notoriously great. In using elongated projectiles, the purpose is to reduce the total resistance encountered in passing through the air and through the target. This is attained by reducing the area of resistance, while the mass is not reduced. Less velocity is lost by them in consequence of the smaller front they offer to atmospheric resistance, as compared with spherical shot of equal weight. After reaching the target they are required, in order to penetrate it, to make smaller holes than spherical projectiles of equal weight, and hence, with an equal striking velocity, will penetrate further. To secure these advantages, the elongated shot

given to the projectile. This motion is totally distinct from the rotation of spherical projectiles just described, and the resulting effect of resistance of air is altogether peculiar. By reference to fig. 2 it will be seen that if the axis of the projectile were always parallel to its initial position, the curvature of the path would cause the resistance of air to act more and more upon the lower side, while the air upon the upper side would be rarefied in the wake of the projectile. The rotation upon the condensed air beneath causes it to roll to the right or left, according to the original direction of rotation; to which deflection the name drift is given. But in reality the axis does not continue parallel to its initial position. It describes very slowly a conical surface, the apex of which is the centre of gravity of the shot; and what is most singular, the direction of this axial motion in pointed projectiles is opposite to that of flat-fronted projectiles. The conical rotation (or precession) of the axis causes an increased drift, the amount of which is even greater than the rolling drift already described.

With pointed shot this deviation is to the right, but with flat-fronted shot to the left. The point of the former also droops, turning obliquely downward and to the right; the flat front turns obliquely upward and to the left. During the flight the former is more nearly tangent to the path than the latter. For uniform projectiles, the drift at moderate ranges is tolerably constant, and may be allowed for in sighting; but for round shot it is hopelessly irregular, sometimes to the right and sometimes to the left. At long ranges the drift of the elongated shot also becomes irregular, and often excessive, amounting sometimes to 200 or 300 yards to the right of the object sighted. There are also vertical deviations, causing over- or under-shooting. In many cases these errors are more serious than lateral drift; for instance, against a battalion of troops, the hull of a vessel, the crest of a parapet, or the body of a deer, where the object is more extended laterally than vertically, and is more liable to be missed by vertical than by lateral error. There is another kind of error which may be called longitudinal deviation, or variation in range. A series of projectiles fired under conditions as nearly alike as practicable will differ in range; partly because no two charges of powder can be made to give exactly the same initial velocity, and partly because slight differences in the forms of the projectiles occasion marked differences in the amount of vertical drift. Hence the form of the trajectory is of great importance. To avoid vertical errors as much as practicable, it is desirable to give a high velocity to the shot; since the swifter its motion, the less curvature will gravitation produce in its path. It is evident that a low or flat trajectory is more dangerous to an enemy than a high one; but the former requires a higher velocity in the projectile than the latter. The trajectories of spherical shot are at



FIG. 2.

must always move with its axis as nearly as possible tangent to its path. But there are several causes which tend to make it rotate about its shortest axis, or tumble. To prevent this, and to give stability to the position of the long axis, a rotary motion about this axis is

first less curved than those of elongated shot; but in the latter part of the flight, at considerable ranges, this relation is reversed. This is because the initial velocity of round shot is almost always greater, and the terminal velocity less, than that of elongated shot; the curvature everywhere being very nearly proportional to the velocity. The so-called "dangerous space" is that part of a projectile's path which is not higher above the earth than 5 ft. 10 in., or the stature of a man. The dangerous space is evidently greater at short than at long ranges, since it depends upon the angle which the descending branch of the trajectory makes with the earth, being greater the less the angle of descent; and the longer the range the greater is the angle of descent; for, to obtain the longer range, the muzzle of the gun must be more elevated, and the descending branch, owing to the resistance of the air, always makes a larger angle with the earth than the ascending branch.—The force of a projectile is measured by the product of its mass into the square of its velocity. The force, although a prime factor in the efficiency of a projectile, is not the only one; for cases may arise in which the energy is too great. Thus in firing at a wooden vessel, a shot with a slow motion, making a large irregular hole, and hurling splinters, will be more destructive than a swift shot, cutting cleanly through, with comparatively little injury. In curved fire from mortars and howitzers, a low velocity is not only necessary, but desirable. Most of the effects of projectiles are accomplished by penetrating the objects against which they are directed, and their work will generally be most effectively accomplished when their energy is moderately in excess of that required for complete penetration. In this connection the penetration of iron vessels becomes of great interest and importance.—The most systematic experiments to ascertain the effect of shot on iron targets have been summarized by Capt. W. H. Noble of the English artillery, who deduces the following rules: 1. If two shot, having the same diameter and form of head, strike with equal energy, the penetration will be the same, though one may be a light round shot, striking with a high velocity, and the other a long heavy shot, with a low velocity. 2. A plate will be equally penetrated by shot of different diameters, provided the energy on striking is proportional to the diameter. Thus, a 12-inch shot must have twice as much energy as a 6-inch shot, in order to penetrate the same plate. 3. The resistance of plates to penetration varies as the square of the thickness. These rules are subject to certain qualifications, depending upon the shape of the head of the shot. A hemispherical head is disadvantageous, because it tends to bulge laterally, and the same is partially true of a flat-fronted shot. The best form is the pointed ogive, which passes through without materially bulging, and makes a hole no larger than its true diameter. The flat-

fronted shot usually rips out a piece, called a button, in the shape of the frustum of a cone, the larger base being detached from the back of the plate. This is carried into the wooden backing, giving an increased resistance as compared with the ogive. Spherical projectiles are liable to flatten against the target and break in pieces. It is apparent that when flattening occurs the increased diameter involves the necessity of making a larger hole in order to penetrate. The striking velocity may be so great that the projectile will be dashed to pieces by its impact, and its energy partially absorbed in its own destruction, instead of that of the target. This is especially true of spherical shot, fired with heavy charges at short range against thick plates. In comparing the effects of spherical and elongated projectiles against iron plates, many quantities must be considered, some favoring one form and some the other; but the final result is strongly in favor of the elongated form. For penetrating earth and battering masonry, similar considerations are applicable.—Concerning the effective range of guns, there is much popular misapprehension. To the scientific gunner the maximum range is of so little moment that its extent for common infantry bullets or for the heaviest seacoast projectiles is unknown. The longest range known to us was attained by one of Sir Joseph Whitworth's projectiles, viz., about 11,100 yards, not quite $6\frac{1}{2}$ miles. The efficiency is greatest near the muzzle, and diminishes as the range increases. A range may be considered effective at which there is a reasonable probability of doing injury. For bullets the effective range will depend upon the way in which the enemy's troops are deployed. Against a skirmish line it cannot much exceed 500 yards, but against massed troops it may be as great as 1,500 yards. With field projectiles an enemy may be harassed at 2,500 yards, or even 3,000. In the bombardment of cities the extreme range is sometimes resorted to, on the assumption that a projectile falling anywhere within the line of fortification may work damage. Effective range turns upon the higher question of probabilities of fire.—Thus far we have discussed projectiles only, since their properties constitute the basis of gunnery. Gunpowder is merely the agent for giving them energy, and the gun for giving them direction. When we examine the relations among the three elements, the problem is highly complicated. We have two forces: the inertia of the shot, and the elastic force of the gases evolved by the powder. It is supposed that the metal contained in a given projectile is cast into a solid cylinder, having the diameter of the bore of the gun. Its length is called the column of metal of the projectile, and constitutes a measure of its inertia. Equal velocities will be imparted to different projectiles when the mean intensity of the forces acting upon them during a given time is proportional to their respective columns

of metal. But the intensity of the force of gunpowder is highly variable at different portions of the path along the bore, being very great near the seat of the shot, and rapidly declining toward the muzzle; hence equal velocities will be imparted only when, at different points in the path along the bore, the respective intensities are proportional to the columns of metal. A complete analysis of the relations existing between the force of gunpowder and the motion of the shot in the gun, in terms of time, space, and mass, has never been attempted; it is a very formidable problem, and its chief difficulty is our ignorance of the rate at which the gases are developed and the quantity of heat evolved. But the greater the resistance opposed to the expansion of the gases of gunpowder, the more rapidly will the powder burn and develop gases, and the higher will be their temperature. Such an increased resistance is offered by an increased column of metal; and hence the conclusion that a longer column of metal carries with it the power of developing more force from a given quantity of powder than a shorter one. On the other hand, the shorter column of metal will still have the higher velocity, though the longer will have the greater energy (mass multiplied into square of velocity); the difference in energy in favor of the latter being due to its greater mass, which more than compensates for its lower velocity. But if the quantity of powder is proportional to the column of metal, a larger charge will develop at every moment more gas than a smaller charge, and give a more intense force. But a larger charge occupies more space in the bore, and robs the projectile of a part of its travel, and hence of a part of the time in which it can receive acceleration. Increasing the charge will increase velocity up to a certain point, but beyond that point will diminish it. In small cannon the maximum pressure is probably reached before the shot has travelled three inches, and in large guns before it has travelled a foot. The time occupied by the shot in traversing the bore probably ranges from $\frac{1}{10}$ to $\frac{1}{100}$ of a second, and depends mainly upon the length of the bore and the quantity of powder. A bold attempt was made by Rodman in 1858 to measure the distribution of the forces of gunpowder, by placing pressure gauges along the bore to register the pressure at different points; and to measure the time of passing over different parts of the bore, by a series of ruptures of electric circuits. (For a description of the pressure gauge, and the electric velocimeter, see GUNPOWDER, and VELOCIMETER.) It is obvious that an increase either in the column of metal or in the charge involves an increase in the intensity of the pressure of the gases, and hence an increased strain upon the gun. As the strength of a gun is limited, both the column of metal and the charge must be regulated accordingly. It is the maximum pressure which is dangerous. In large guns this diffi-

culty is serious. Not only is a higher pressure produced by the longer column of metal, but the pressure is distributed over a larger area of bore, and the bursting tendency is in the ratio of the product of these two quantities. The greater thickness of walls gives increased resistance, but this increase is in a lower ratio than that of the bursting tendency, and hence large guns are relatively weaker than small ones. To compensate for this difficulty, constructors have resorted to metals of greater strength, and especially have modified the action of the powder, so that the maximum pressures have been reduced, and the subsequent lower pressures have been increased. Thus the total effort of the powder upon the shot is undiminished. (See GUNPOWDER.) The column of metal of a spherical shot is two thirds its calibre; that of an elongated shot is usually between one and three fourths and twice its calibre. The latter limit has been found to be about as great as the strength of the gun will permit in large calibres. It is sometimes exceeded with very little advantage in the smaller and intermediate calibres. The charge of powder varies from one fourth to one tenth the weight of the projectile. With round shot it is sometimes as high as one third; but it is found that the velocity is not much increased when the charge is greater than one fourth. The velocities imparted to round shot vary from 1,400 to 1,750 ft. per second, and those of elongated shot from 1,150 to 1,500 ft.—For a good introduction to the science of gunnery, see "Ordnance and Gunnery," by Major J. G. Benton, U. S. A., and "Treatise on Artillery," by Lt. Col. C. H. Owen, R. A.

GUNNY, a coarse cloth made in India of the fibres of two species of *corchorus*, and used for the sacks in which saltpetre, pepper, and other articles are packed for exportation. The bagging itself is also exported. The export of gunny bags and cloth from Calcutta is chiefly to the United States, and they are mainly used at the south for cotton bagging. For the year ending June 30, 1872, the imports of gunny cloth and bags were as follows:

PORTS.	Pounds.	Value.
Baltimore.....	641,262	\$44,207
Boston and Charlestown.....	3,340,723	133,559
New Orleans.....	81,148	4,996
New York.....	7,850,394	310,829
San Francisco.....	218,068	11,240
Savannah.....	8,765	277
Other ports.....	2,244	58
Total.....	12,137,603	\$505,566

There were reexported 654,139 lbs. of gunny cloth and bags, valued at \$34,929, chiefly to England and Turkey. (See JUTE.)

GUNPOWDER, a compound of nitre, charcoal, and sulphur, employed as an explosive. Its composition is described in the article EXPLOSIVES. The date and the author of the inven-

tion are buried in obscurity. Sebastian Münster (1544) wrote concerning it that tradition and literature generally ascribed the discovery of "the dreadful cannon" to the year 1380, and that the majority believed the inventor to have been a monk; adding that "the villain who brought into the world so mischievous a thing is not worthy that his name should remain in the memory of men." This allusion refers to "the black Barthel," or Berthold Schwarz, a monk of the Hartz or the Rhineland, concerning whom there is much dispute. The following condensed extract from a long chronological statement, compiled by Rziha, shows the controversy about Schwarz to be of subordinate importance:

- A. D.
50. The Chinese (according to tradition) had already obtained from India a knowledge of gunpowder.
215. Julius Africanus (according to Meyer) described its preparation.
663. Callinicus of Heliopolis introduced Greek fire to the Byzantines. This was probably a mixture like gunpowder, with resin and petroleum; it was certainly no fluid, and according to one author was used to project stone balls from pipes. It may nevertheless have been a rocket mixture or a bomb filling.
690. The Arabs used firearms against Mecca, bringing the knowledge of them from India.
811. The emperor Leo employed firearms.
846. Marcus Gracchus, a Greek author (MS. said to be at Oxford), described a mixture of 1 lb. of sulphur, 2 lbs. of charcoal, and 6 lbs. of saltpetre.
850. Leo the Philosopher made rockets for the army of the eastern empire.
1073. King Solomon of Hungary bombarded Belgrade with cannon.
1095. In a naval battle near Toledo, the ships of Tunis shot "fiery thunder."
1098. The Greek ships used artillery against the Pisans.
1232. The Tartars employed "fire pipes" against the Chinese.
1238. Don Jaime threw into Valencia fiery balls which burst.
1247. Seville was bombarded with artillery.
1249. Damietta was defended against St. Louis with bombs, which on this and other occasions were much dreaded by the crusaders.
1250. Death at Cologne of Albertus Magnus, a preaching monk, said by some ancient writers to have invented "*bombardum, bombardulum et scolpum naualeum*."
1294. Death of Roger Bacon, in whose works the destructive qualities of saltpetre, and the production of terrible thunder and lightning from its compounds, are alluded to as well known.
1303. Reported date on an ancient cannon, now in the arsenal of Amberg, Bavaria.
1303. The Spaniards had artillery before Gibraltar.
1311. Henry VII. bombarded Brescia with "thunder guns."
1312. The Arabs had cannon before Baza.
1326. Martos was attacked with artillery.
1330. Berthold Schwarz is said to have discovered gunpowder. Different authors say 1320, 1354, and 1350. MSS. in the monasteries perhaps informed him.

From this time on, the allusions to the use of gunpowder become far more numerous and authentic. Plainly, its military use was revived in Germany, and carried thence to Italy. There is record of a powder mill at Augsburg in 1340; and in 1344 (or 1357, or 1366) Petrarch described the terrible effects of the newly invented but already widely used powder and cannon. They are said to have been employed at Alicante in 1331, at Pui Guillaume in 1338, at Salado in 1340, at Algeciras in 1342, and at Crécy in 1346. In 1378 the English had 400 cannon before St. Malo. In 1397 mines were exploded with powder before Merat; and the same tactics were employed on a larger scale

at Belgrade in 1441, at Milan in 1523 (with poor success), and by the Turks in 1529 at Vienna, and in 1565 at Malta. England imported gunpowder from Sweden and elsewhere until 1560, when its domestic manufacture began.—The employment of gunpowder for blasting rocks is far more recent than its military use. The following dates and memoranda will convey an epitome of its history in this respect: In 1613 Martin Weigel, chief superintendent at Freiberg, proposed boring and blasting in the mines. Traditions of an earlier use in Germany have probably arisen from confounding the ancient method of building fires in the mines, to crack the hard rocks, with that of blasting. It was about 14 years before the new method was successfully introduced in Germany. Reckoning from 1613, the process was carried to England by German miners after 57 years, to Sweden after 111 years. For 72 years the bore holes were closed with solid plugs, instead of clay tamping; for 83 years the practicability and advantage of small holes were unknown; and for more than a century the operation of blasting was considered as merely auxiliary to the work of the pick, gad, hammer, and chisel. (See **BLASTING**.)—The manufacture of gunpowder has been greatly improved from time to time in mechanical details, affecting both the safety of the process and the quality of the product. The first step is the preparation of the ingredients. The original impurities in a solution obtained by leaching saltpetre earth are nitrates of soda, lime, and magnesia; chlorides of potassium, sodium, calcium, and magnesium; sulphate of lime, various salts of ammonia, and organic substances (humus) partly held in solution by carbonate of ammonia. By the processes of the saltpetre manufacture these impurities are reduced to two principal ones, the chlorides of potassium and sodium, which are still contained in the commercial saltpetre. These salts, which if allowed to remain would attract moisture and deteriorate the powder, are removed by a simple process of refining, based upon their relative solubility at different temperatures. The proportions that will be dissolved by 100 parts of water at various temperatures (centigrade) are as follows:

SALTS.	0°	12°	16°	18°	45°	97°	100°
Saltpetre.....	13.8	.....	.....	29.0	74.6	236	400
Chloride of potassium	29.3	34.5	35.0	.....	.....	57.0	.....
Chloride of sodium.....	35.6	36.0	.....	.....	.....	39.9	.....

It will be seen that the solubility of chloride of sodium does not greatly increase with temperature. If desirable, the chloride of potassium can be altogether transformed into chloride of sodium by the addition of nitrate of soda, which by a double decomposition yields both chloride of sodium and additional saltpetre. A crude material, containing say 4,800 lbs. of saltpetre, 360 lbs. of chloride of potas-

sium, and 840 lbs. of chloride of sodium, would be refined by simple recrystallization, somewhat as follows: Half the mass would be dissolved in 1,200 lbs. of water, and heated to 100° C., while the remainder was added. This would dissolve also all the chloride of potassium, but leave a large part (516 lbs.) of the chloride of sodium. From the solution the organic impurities are removed by adding a little glue, boiling, and skimming, after which the temperature is allowed to fall to 18° C., at which point about 4,452 lbs. of saltpetre will be precipitated, 6 lbs. of chloride of sodium, and no chloride of potassium. A further recrystallization will reduce still more the amount of impurity. This is the outline of the process adopted. It is modified by operations intended to hinder the formation of large crystals of saltpetre, which always contain enclosed portions of the mother liquor. The final product should never contain more than $\frac{1}{100}$ of 1 per cent. of chlorides. In fine sporting powders the proportion of chlorides is usually not more than $\frac{1}{100}$, or sometimes $\frac{1}{1000}$, of 1 per cent. After a thorough drying by heat, the saltpetre is ground to the finest possible state, either with millstones or in mills specially constructed.—Charcoal is the principal form of carbon capable of giving an explosive gunpowder. Graphite or anthracite, when substituted, yields a compound which burns with some vigor, but not explosively. The causes of this peculiarity are not known with certainty. The wood selected for the charcoal is usually the young shoots of alder and willow. The bark being removed, they are placed in iron retorts and subjected to distillation, expelling the greater part, sometimes nearly the whole, of the hydrocarbons. Three grades of charcoal are recognized: red charcoal, containing about 8 or 9 per cent. of hydrocarbons, and having a strong red tinge; brown charcoal, containing 4 to 5 per cent. of hydrocarbons; and black charcoal, containing about 1 to 2 per cent. The red charcoal makes the strongest powder, and is generally used for the sporting variety; the black, and sometimes the brown, is preferred for heavy ordnance. The sulphur selected is refined brimstone; flowers of sulphur is objectionable because it contains sulphuric acid. The mixture is commenced by pulverizing the charcoal and sulphur together. They are rolled in barrels with small iron balls for about six hours, and are ultimately reduced to extreme minuteness. The saltpetre is then added, and another rolling with zinc or copper balls is given. The mixture is then carried to the mill, where it is moistened with water, and placed in a large circular pan or trough, in which iron wheels, weighing several tons and having broad treads, are rolled by machinery, triturating and kneading the powder into the most intimate mechanical union. The milling is the dangerous part of the process, and a year seldom passes at a powder manufactory without one or more explo-

sions at the wheel mills, though the precautions are such that these accidents are seldom disastrous. The powder withdrawn from the wheel trough is very lumpy and irregular; it is therefore reduced by a breaker to a fine meal, in which condition it is transferred to a very powerful press. The meal is stacked into the form of a cheese, 2 or $2\frac{1}{2}$ ft. square and 3 or 4 ft. high, consisting of layers of powder 1 to 2 in. thick, separated by plates of copper or vulcanite. The press reduces the bulk of the powder nearly one half, and delivers it in sheets five eighths of an inch to an inch thick, which, in hardness, lustre, and fracture, resemble thick slates. The degree of pressure to be given is one of the most important considerations in the process of manufacture; since the ultimate density of the powder is determined by it, and this in turn determines the rate of combustion. By merely varying the degree of pressure, the powder may be made either violently and destructively explosive, or mild and easy in its action. The press cakes are broken into grains by passing them through corning rolls, and the different sizes of grains are separated by passing the whole over a succession of sieves, with varying mesh. The grains thus obtained are sharply angular, and require rounding and smoothing to prevent their thin edges from being ground into dust by the wear of transportation and handling. While still moist, the powder (now granulated) is put into rolling-barrels, slowly revolved from 6 to 24 hours, and then withdrawn smooth, lustrous, and free from angularity. Sometimes the glazing is heightened by the addition of a minute quantity of graphite. A single tablespoonful of this substance will impart its peculiar lustre to half a ton of fine powder. Its presence has no appreciable effect upon the action of the powder, nor upon its preservation. The last operation, drying, takes place in a room heated by steam to 130° or 140° F.—Much progress has been made in the past 20 years in diminishing the destructive effects of gunpowder upon large cannon. A brief consideration of the relations between the pressure of a body of gas and the volume it occupies will readily indicate that the elastic force of gases generated by the combustion of gunpowder in a gun must be many times greater at the breech than at the muzzle; that is, greater in the earlier than in the latter stages of discharge. It is the maximum pressure which involves danger to the gun; and the principle upon which this progress has been based consists in keeping the maximum pressure well within the limit of safety, and increasing as far as possible all pressures below that limit. To accomplish this, advantage has been taken of the following properties: The combustion of a cartridge is not instantaneous, but progressive. It must first be ignited throughout, by flame from the vent, which diffuses itself through the interstices between grains, enveloping progressively the whole. Secondly, each grain must

burn progressively from its surface to its centre. It is obvious that the pressure due to any particular position of the shot will depend upon the total amount of gas developed; and hence, if we can retard the combustion in the initial and accelerate it in the terminal stages, we can, in part at least, accomplish the desired end. At all events, we can reduce the initial gas development in two ways: first, by diminishing the amount of surface presented for ignition by a given weight of powder, which is done simply by increasing the size of the grain; secondly, by decreasing the rate at which combustion progresses into each grain, which is done by increasing the density of the grains, and thus closing more tightly the pores through which ignition penetrates their mass. The effect of diminishing the initial pressure without a compensating increase of the terminal pressures would be a reduction of the velocity of the shot. This may be restored by an increase of the charge, which augments again the initial pressure, but not to such an extent as to carry it beyond the limit of safety. By increasing the size and density of the grains

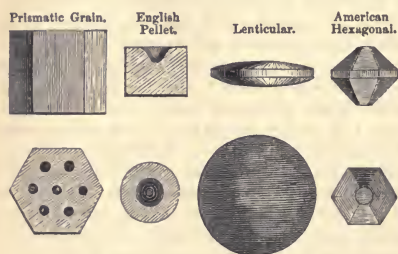


FIG. 1.—Forms of Gunpowder.

while increasing the charge, artillerymen have retained control of the energy of gunpowder, and at the same time have actually increased the velocities of even the largest projectiles. For instance, in 1864 the American 15-inch gun, when using 50 lbs. of powder and a shot of 450 lbs., showed a pressure of about 15,000 lbs. and an initial velocity of 1,100 ft. per second. At present (1874) the same gun and shot, with 120 lbs. of powder, give about 22,000 lbs. pressure and 1,730 ft. initial velocity. Another improvement consists in giving to the grains definite geometrical forms. The advantage of this modification results not so much from the form itself, as from the fact that the action of the individual grains is much more likely to be uniform. In the process of pressing the powder, by the methods which have been in use for many years, great irregularities of density always occur; and as the explosive property is more influenced by the density than by any other quality, the advantage of securing uniformity in this respect is manifest. Geometrical or "pellet" powder requires a mould for each grain, whereby the density can be regulated with far more precision than by

the old method. A leading variety of these geometrical forms is the prismatic, in which the grains are hexagonal prisms, about an inch in length and diameter. Each prism is perforated with seven holes, one tenth of an inch in diameter, parallel to the axis. They are symmetrically packed into a cartridge, of very small bulk in proportion to its weight. This form of powder is used for large rifled (Krupp) guns in the Russian, Prussian, and Austrian service, and its performance is excellent. Short cylinders have been used by the English, but they have been supplanted recently by pebble powder. Lenticular powder (grains in the form of lenses) has been tried in this country, but with indifferent results. The central portions, as a necessary result of the mode of pressing, were much less dense than the peripheral, and therefore burned too rapidly. Grains which had been ignited in the gun and extinguished in the air, and collected afterward, showed that the middle portions only had been consumed, leaving a ring of the denser portions. Ritter prismatic powder is simply the prismatic form just described, but without the perforations; it has been used in Belgium only. In recent experiments under the United States government, pellets in the form of two truncated pyramids, having a common hexagonal base, have been employed; and the results appear to be better than those obtained by any other nation. The irregular, large-grained powder, used in heavy guns, receives the name mammoth powder in this country, and pebble powder in England; but these titles indicate no essential difference.—Gunpowder is classified, according to the size of the meshes through which the grain is sifted, into 11 numbers, from 0 to 10, the latter being the finest rifle powder, and the former the mammoth. In classifying it according to quality, each maker has his own method and nomenclature. In the United States government service it is classified into: 1, musket; 2, mortar; 3, cannon; 4, mammoth powder. Two sieves are used for separating the grains of each class, all the grains being required to pass through the larger, and none through the smaller. The sizes of the meshes in decimal parts of an inch are:

CLASS.	Large. . Small.	
Musket	·06"	·08"
Mortar	·10	·06
Cannon	·35	·25
Mammoth	·90	·60

The density of granular powder is either the absolute density, which is that of the grains themselves, or the gravimetric density, which is that of a quantity of grains with their interstices. The absolute density ranges from 1·60 to 1·80, the most common figure being about 1·75. The gravimetric density is generally about equal to that of water.—Sporting powder is made with especial care, of the purest saltpetre and sulphur, and the most carefully

selected charcoal. The article is usually judged by the velocity it gives to a projectile, and the amount of fouling. In both respects erroneous judgments are likely to be formed, since the mode of charging is more frequently the cause of a poor performance than any defect in the quality of the powder. If a given brand is found to give a lower velocity than desired, it is better to increase the charge than to resort to a more violent kind; for the smaller charge is more apt to strain and erode the gun than the larger charge of milder powder. There is seldom any sufficient reason for excessive fouling, since this may generally be corrected by the use of a patch and lubricant.—The force of gunpowder is measured by an instrument called a pressure gauge. Three forms have been used, two of which were invented by Gen. Rodman of the United States ordnance department. One of these is applied to the exterior

the knife, the apex of which sinks into the copper, giving a cut, the length of which serves as the measure of the pressure. The working parts of the external gauge are quite similar to the foregoing, but the manner of housing them is different. Another form of gauge, invented by Capt. Noble of the English artillery, substitutes for the copper disk a short cylinder of copper, which is crushed by the pressure, the amount of crushing being employed to measure the pressure. This gauge is screwed into the wall of the gun in such a manner that the end of the rod receiving the pressure is very near the surface of the bore. Both forms of gauge are liable to grave objections, since the measure obtained is essentially dynamical, while the quantity to be measured is statical. The English gauge is much inferior to the American, and cannot be relied upon to give even approximate indications of pressure when violent powder is used.—In the composition of blasting powder, nitrate of soda (Chili saltpetre) has of late years been chiefly used in the United States, instead of nitrate of potassa; the latter being subject to a high duty, while the former is duty-free. So far as explosive properties are concerned, the difference between the two is not very great; but the former absorbs moisture from the air and deliquesces, while the latter does not, unless the air be very damp and the exposure long continued. Hence nitrate of soda rapidly deteriorates, a matter of comparatively little importance in blasting powder, which is commonly used soon after manufacture. (For the constitution of other blasting powders, see EXPLOSIVES.) But as war material is frequently accumulated and stored, or transported long distances and more or less exposed, military powder must be made with nitrate of potassa. Powder for blasting differs essentially from military or sporting powder in the formation of CO instead of CO₂, yielding the same volume of gaseous product for the same temperature, but less heat; hence a lower temperature of products, and consequently a lower immediate explosive energy. The combustion is also slower. The theory of its use has been to loosen the surrounding rocks to as great a distance as possible from the bore hole, and to waste as little force as possible in the hurling of fragments or the production of very small pieces, or dust. Usually a good deal of work with the pick and bar, and of subsequent breaking or blasting of large fragments, has accompanied the main blasting operations. The introduction of nitro-glycerine compounds has led to a change of practice; and many engineers now find a gain in the more complete shattering of the rocks by quick explosion, which permits an easier handling and a more rapid progress, besides, what is economically most important, the substitution of single-hand drills and small holes. Even rifle powder is now used in this way, it is said, with good results. The most judicious authorities appear to agree, however, that the nature of the rock

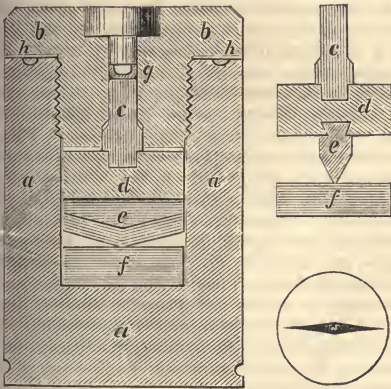


FIG. 2.—Rodman's Internal Gunpowder Gauge.

a a, cylindrical steel box; *b b*, cover; *c*, steel piston rod; *d*, steel disk, carrying *e*, the indenting knife; *f*, disk of soft copper; *g*, copper cup for gas check; *h h*, copper washer.—The smaller figures show the parts *c*, *d*, *e*, and *f*, enlarged, and viewed from the side, and the indentation made on the copper disk.

of a gun, and communicates with the chamber by a narrow passage. The other is inserted in the cartridge bag at the base of the charge, and remains in the gun after the discharge. The internal gauge consists of a cylindrical box of steel, with a cover screwed on. Through the axis of the cover is a cylindrical hole, in which a steel rod is fitted. Within the box is a thick disk of steel, having a knife edge protruding from its lower face. This knife has a double shear, the edges of the two shears meeting at the centre in a very obtuse angle. At the bottom of the box the apex of the knife rests upon a disk of soft, annealed copper. The inner end of the steel rod is stepped into the steel knife disk, and its outer end is a little below the top of the cover. A copper cup rests upon the top of the rod, to serve as a gas check. The pressure of the explosion is received by the rod, which communicates it to

to be removed is an important element in the problem, and that the system which answers well in one mine is not necessarily the best in all. For quarries in which stones of certain shape and size are to be obtained, and for such coal mines as employ blasting, of course the shattering effects of charges are specially undesirable; and either small charges or slow-burning explosives must be preferred. The amount of ordinary blasting powder required to remove a cubic yard of rock in mining is exceedingly variable, depending upon the nature, structure, and tension of the rock, as well as the quality of the powder and the skill of the workman. This variety is illustrated by the following data, chiefly selected from the records of European experiments, as to the amount of powder required to remove one cubic yard of material:

SUBSTANCES.	Localities.	Powder, lbs.
Rock salt.....	Wieliczka, Austria....	0.05
"	Dienze, France.....	0.59
Coal.....	Waldenburg, Prussia...	0.02
"	Silesia, Prussia.....	0.17
Copper schist.....	Hartz, "	0.26
Gypsum.....	"	12.43
"	"	3.31
Marble.....	France.....	3.61
Limestone.....	"	1.62
"	"	4.52
Sandstone.....	"	1.92
"	"	2.40
"	"	3.28
" (rothliegenden).....	Hartz, Prussia.....	4.17
"	"	4.50
"	"	6.49
"	"	8.93
Galenite.....	"	1.31
Clay slate.....	"	3.51
Quartz.....	"	1.78
Quartzite.....	Ireland.....	1.85
"	Norway.....	2.34
"	France.....	12.30
Gneiss.....	Saxony.....	1.37
"	"	4.85
" (firm).....	France.....	8.83
"	Tunnel near New York.	14.97
Granite.....	France.....	0.65

An inspection of this table shows how greatly experience varies. It also appears that hardness is not the only quality involved in the resistance offered by rocks. Thus gypsum, which is one of the softest rocks, resists blasting by virtue of its lack of firmness and its elasticity. Native copper can scarcely be blasted at all, on account of its tenacity. (See BLASTING.)—The amount of capital and annual product of the gunpowder manufacture in the United States is reported by the ninth census (1870) as follows:

STATES.	Capital.	Value of product.
California.....	\$573,000	\$526,427
Connecticut.....	635,000	751,000
Delaware.....	1,400,000	737,800
Massachusetts.....	199,500	199,000
New York.....	270,000	547,519
Ohio.....	150,000	275,000
Pennsylvania.....	752,900	873,033
Tennessee.....	20,000	60,000
Wisconsin.....	20,000	32,000
Total.....	\$4,020,400	\$3,991,779

GÜNS (Hung. *Kúszeg*), a town of Hungary, in the county of Vas, on a river of its name, 57 m. S. S. W. of Presburg; pop. in 1870, 6,915. It contains a palace of Prince Esterházy, a Benedictine monastery, and several churches and educational establishments. Wool is largely manufactured, and there is considerable trade in wine and fruits, especially cherries. In 1532 it was besieged by Sultan Solymán the Magnificent, with 60,000 men, who made thirteen assaults on the fortifications, all of which were repulsed by a small Hungarian garrison, commanded by Nicholas Jurisich.

GUN-SHOT WOUNDS, injuries caused by the discharge or bursting of firearms. They are of two classes, according as the explosion of the powder does or does not carry solid projectiles. Slight wounds from powder alone are properly burns; but if the quantity of powder be large or in a confined space, serious contusions and lacerations may ensue. Not only the expansion of the liberated gases, but the unburned portions of powder, and the contact of surrounding bodies put in motion by the explosion, are to be considered in these complicated wounds, though their treatment is ordinarily the same as for burns, lacerations, and contusions from other causes. These wounds are purely mechanical, and are more dangerous in proportion to the contiguity to vital organs; an explosion from a pistol introduced into the mouth or near the thoracic or abdominal cavity might prove fatal, while the same on the back or limbs would be trifling. A wound from a musket ball in a fleshy part presents an opening of entrance smaller than the ball in most cases, and with livid and inverted edges, and the opening of exit, if there be such, larger, more ragged, and with everted edges; if the ball was fired very near, the entrance is larger than the exit. These facts often enable an expert to tell the direction and the distance from which a wound was received. The diminished velocity of the ball, its more rapid rotation on its axis, and its consequent more lacerating progress, explain the larger and more irregular opening of its exit. A slight obstacle is sufficient to divert a ball from its original direction, causing singular eccentricities in its course; a trifling obliquity of surface, or difference of density in the parts struck, may produce the most circuitous passage. A ball may enter on one side of the head, neck, chest, abdomen, or limb, and pass out on the other, having apparently passed directly through, whereas it has really passed entirely round. Spent balls cause injuries of great violence and with little apparent external wound. These cases were formerly attributed to the wind of the ball, from compression or displacement of air in its course; but it is now known that a ball after a certain period of its course acquires a rotary motion on its axis, the more rapid as its progress is nearly ended. If a ball with such a motion strike a part of the body, it does not pierce or carry it

away, but simply rolls over it like a wheel, crushing the unyielding and resisting tissues, without necessarily lacerating the skin; contusing the viscera, for instance, without opening the abdominal cavity. A ball in its course may meet and force into the body pieces of clothing, bone, or other foreign bodies, more mischievous than the original projectile. The pain of a gun-shot wound is dull and heavy, though in the excitement of battle it would be less noticed than a sabre or bayonet wound. The bleeding is generally less externally than would be supposed, unless a large artery be severed. The constitutional disturbance is great and peculiar. Paleness and coldness of surface, trembling and weakness of limbs, faintness, alarm, and confusion of mind, are more marked than in other kinds of wounds of equal severity. In common cases, inflammation comes on in the course of 24 hours, with swelling and stiffness, and pain; pus forms on the third or fourth day, and in the course of the next five days more or less of the parts torn by the ball slough away; this over, granulations form, the wound contracts, and heals in six or eight weeks, the lower opening closing first. In healthy persons the constitutional disturbance is neither great nor of long duration. In unhealthy constitutions inflammation runs high, the suppuration is profuse and obstinate, and the patient recovers with a disabled limb or an enfeebled body. If the ball or a foreign body carried with it enters a sensitive or vital part, there will be no safety until it comes away; but if it enters parts without much sensibility and presses upon no nerve, it may remain for years without inconvenience. Mortification of a limb after a gun-shot wound may arise from the severity of the wound, the excess of inflammation, or division of the large blood vessels. Another dangerous complication of these wounds is secondary hæmorrhage from excess of arterial action, separation of sloughs from arteries, ulceration of their coats, or general inflammatory exudation; this is most likely to occur in persons of sanguine temperament, when exposed to the depressing influences of hospital life. The prognosis in these wounds should be given with much reserve, as it is impossible in most cases to predict the exact result. If the thoracic and abdominal cavities or the joints are penetrated, or any important organ is wounded, with injury of large vessels or nerves, or comminuted fracture of bones, the danger of a fatal termination is great. But, apart from the battle field, there are instances of survival after great injuries of vital organs. Perhaps the most notable case is that of Alexis St. Martin, recorded by Dr. Beaumont. (See BEAUMONT, WILLIAM.) Among other cases are those of William Poole, a New York rough, who lived for some time with a ball lodged in the substance of the heart, and of Virginia Stewart, a woman of the town in the same city, who lingered for several days after a pistol bullet had passed through her

brain. The wounds made by conical rifle balls are attended with much laceration of soft parts and splintering of the bones.—The treatment of simple gun-shot wounds does not materially differ from that of lacerations and deep punctures. Cleansing of the openings, the arrest of hæmorrhage, stimulants and opiates, antiphlogistic and soothing applications, free exit of pus, and rest of the part, are the principal points to be attended to; if there is but one opening, search should be made, by dilatation if necessary, for the ball or other foreign body, which should be extracted if it is likely to prove inconvenient or dangerous; secondary hæmorrhage will require compression, cold, caustic, or the ligature, according to circumstances. In cases of severe laceration with splintering of bones, the question of primary or secondary amputation becomes one of the most difficult the surgeon has to decide.—In the "Medical and Surgical History of the War of the Rebellion," published by the United States government in 1870, will be found the best collection of cases and illustrations of gun-shot wounds in any language.

GUNTER, Edmund, an English mathematician, born in Hertfordshire about 1581, died in London, Dec. 10, 1626. He was educated at Westminster school and at Christchurch college, Oxford, where he gave his attention principally to mathematics, and in 1606 invented the sector. Subsequently he took orders; but his tastes being altogether mathematical, he procured in 1619 the professorship of astronomy in Gresham college, which he filled until his death. His works, consisting of the *Canon Triangulorum*, "The Sector and Cross Staff," &c., have been several times printed in a collective form, the best edition being that of 1673 (4to, London). His inventive faculty was very usefully exercised in the production of the chain, the logarithmic line, the quadrant, and the scale bearing his name, of which descriptions are subjoined.—**GUNTER'S CHAIN**, the chain employed in land surveying, is 66 feet or 4 rods in length, and is divided into 100 links, which are connected with each other by one, two, or three rings. The length of each link, together with half the length of the rings connecting it with the adjoining links, is 7.92 inches; every 10th link is marked by a tally of brass, for convenience in measuring, and part of the first link at each end is formed into a large ring for the purpose of holding it with the hand. Ten square chains, or 100,000 square links, make one acre.—**GUNTER'S LINE**, a logarithmic line, sometimes termed the line of lines or line of numbers, and usually graduated upon scales, sectors, &c., consists simply of logarithms graduated upon a ruler, thus serving to solve problems instrumentally, as logarithms do arithmetically. It is generally divided into 100 parts, every 10th division being numbered from 1 to 10. By means of this line the following problems can be solved: 1. To find the product of two numbers: the

space between division 1 and the multiplier is equal to the space between the multiplicand and the product, the distance in each case being laid off in the same direction. 2. To divide one number by another: the extent from the divisor to unity equals that from the dividend to the quotient. 3. To find a fourth proportional to three given numbers: the space between the first two numbers equals the distance from the third number to the required fourth proportional. 4. To find a mean proportional between any two given numbers: one half the distance between the lesser number in the left-hand part of the line, and the greater number in the right-hand part, will extend to the mean proportional sought, if applied forward from the lesser number, or backward from the greater. 5. To extract the square root of a number: one half of the distance between unity and the given number, if laid off from unity, will give the point representing the desired root. Similarly, the cube root or that of any higher power can be found, by dividing the distance between unity and the given number by the index of the root, the quotient giving the distance between unity and the point representing the root required.—GÜNTHER'S QUADRANT is usually made of wood or brass, and contains a kind of stereographic projection on the plane of the equinoctial, the eye being supposed in one of the poles. The tropic, ecliptic, and horizon form arcs of circles, but the hour circles are curves, delineated by means of several altitudes of the sun for some particular latitude every year. It can be used for the determination of time, the sun's azimuth, &c., and also for taking altitudes of any object in degrees.—GÜNTHER'S SCALE, generally termed by seamen the Gunter, is a large plain scale, generally 2 ft. long by about $1\frac{1}{2}$ in. broad, and used in solving problems in navigation, trigonometry, &c. On one side of the scale are natural lines, and on the other the artificial or logarithmic ones; the former side contains a scale of inches and tenths, two plain diagonal scales, and various lines relating to trigonometry as performed by natural numbers.

GÜNTHER, Anton, a German philosopher, born in Lindenau, Bohemia, about 1785, died in Vienna, Feb. 24, 1863. He studied at the university of Prague, and, after passing several years as tutor, devoted himself to theology at the college of Raab, and in 1820 was ordained priest. He passed two years at a novitiate of the Jesuits, and then took up his residence at Vienna, where he was vice director in the university and imperial censor. He became eminent as a writer on philosophical subjects. But while he combated the views of Hegel and Herbart, and endeavored to reconcile the doctrines of the Catholic church with the teachings of modern philosophy, he blamed the fathers of the church for having employed pagan conceptions in seeking to impress the truths of religion. He incurred the disapprobation of the Jesuits, and was summoned to

Rome, but was prevented by ill health from attending in person. All his works were placed upon the *Index Expurgatorius* in 1857. They include *Vorschule zur speculativen Theologie* (2 vols., 1828); *Peregrins Gastmahl* (1830); *Thomas à Scrupulis* (1835); *Die Juste-Milieu in der deutschen Philosophie gegenwärtiger Zeit* (1838); *Der letzte Symboliker* (1844); and *Grundriss der Metaphysik* (1848).

GURLEY, Ralph Randolph, an American clergyman and philanthropist, born at Lebanon, Conn., May 26, 1797, died in Washington, D. C., July 30, 1872. He graduated at Yale college in 1818, and soon after took up his residence in Washington. He was licensed to preach by the presbytery of Baltimore, but was never ordained. In 1822 he became agent of the American colonization society, a position which he retained until his death. He visited Africa in behalf of colonization three times, under appointment of the society or of the United States government, and aided in the organization of the Liberian government. He also visited England for the purpose of securing English aid for African colonization. During the first ten years of his agency the annual income of the colonization society increased from \$778 to \$40,000. He delivered speeches in its behalf in all parts of the country, edited the "African Repository," and besides many reports wrote "The Life of J. Ashmun" (Washington, 1835), "Mission to England for the American Colonization Society" (1841), and "Life and Eloquence of Rev. S. Larned" (New York, 1844).

GURNARD, an acanthopterous fish belonging to the family of *sclerogenidae* or "mailed cheeks," characterized by a prolongation of the suborbital bones forward across the cheek, and immovably articulated behind with the preoperculum; the muzzle is also formed by a firm union of the frontal and other bones; and all these parts present a hard granulated appearance, often armed with spines. The gurnards belong to the genera *trigla* (Linn.) and *prionotus* (Cuv.), the latter being peculiar to America. In the genus *trigla*, in addition to the family characters, the body is scaly; there are two dorsal fins, the first spinous, the second flexible; the pectorals are moderate, and beneath them and at the base are three detached articulated rays on each side; branchiostegal rays seven; head of a parallelopiped form; teeth small and villiform on the jaws and pharyngeals; lateral line straight to the caudal, where it forks, variously armed with spiny scales. The gray gurnard or grunter (*T. gurnardus*, Linn.) grows to a length of 15 to 20 in., and rarely to 2 ft.; the body is more elongated and the snout longer than in most other species; the descending line of the profile is nearly straight; the snout is shovel-shaped, slightly emarginated, having on the top eight hard bony points; the head and shoulders granulated, and armed with spines; lateral line sharply serrated, and the dorsal scales

rough. The color above is gray clouded with brown, more or less spotted with black and yellowish white; below silvery. It is common on the English coasts, and is found from Norway to the Mediterranean; it keeps near the bottom, and feeds on crustaceans and mollusks, spawning in May and June; when taken



Gray Gurnard (*Trigla gurnardus*).

from the water it makes a kind of grunting sound (whence one of its common names), which cannot proceed from the air bladder, as this has no duct communicating externally. Notwithstanding its hideous appearance, its flesh is white, firm, and wholesome; it is caught in deep water, biting at almost everything, even a red rag. The habits of this fish are easily studied in the aquarium. They may be seen with their pectorals close to the sides, and with no motion of the tail, crawling along the bottom by means of the free pectoral rays, which are placed successively on the ground like so many feet; their light weight, rendered less by their capacious air bladder, is thus moved with considerable rapidity forward, backward, or sideways in search of food. These free rays are moved by a muscular apparatus independent of that supplying the common fin; to these rays are also distributed large nervous filaments, arising from a marked expansion of the upper part of the spinal cord, indicating that these organs are endowed with a delicate sense of touch. It stirs up the mud and sand with its shovel-shaped nose, and is enabled to detect its prey in the turbid water by means of these pectoral feelers. The large

by the larger pectoral fins, and by the villiform teeth on the palate bones. The banded gurnard (*P. lineatus*, Mitch.) grows to a length of 12 to 18 in.; it is reddish brown above, covered with numerous black dots, and the abdomen white; the color of the dead fish above the lateral line is slaty, and beneath there are several brownish bands, whence its name; the head is covered with bony plates, rough, and armed with spines; the upper jaw the longer. It is found on the coast of Massachusetts and the middle states. It is called also grunter and sea robin. The web-fingered gurnard (*P. palmipes*, Storer), a much rarer species, grows to the length of about 18 in., and may be known by the dilated ends of the pectoral processes; the color is reddish brown above, with irregular darker shadings, and nearly white below. When alarmed, it buries itself in the sand by a rapid lateral movement of the body, leaving only the eyes and top of the head exposed; the flesh is occasionally eaten; it feeds principally on crustaceans. It is found from Massachusetts as far south as the Carolinas, and perhaps further. Other species are described.

GURNEY, Sir Goldworthy, an English inventor, born in Cornwall in 1793. He was educated for a physician, but gave his attention to chemistry, and in 1822 delivered a course of lectures at the Surrey institution on chemical science, which were published in 1823. He invented the Bude, oil vapor, lime, and magnesium lights, and claims to be the inventor of the oxyhydrogen blowpipe, and to have first produced the startings of the magnetic needle by cross currents from the voltaic battery, which form the basis of the electric telegraph. He also invented the high-pressure steam jet and the tubular boiler, and in July, 1829, drove a steam carriage on the turnpike from London to Bath at the rate of 14 m. an hour. His high-pressure steam jet, being applied to locomotives in October, 1830, increased the speed from 12 m. an hour to 30. It has since been used for the ventilation of coal mines and for extinguishing fires in them. In 1849 he applied it to the consumption of poisonous gases from a sewer in London. In 1852 he was appointed to superintend the lighting and ventilating of the new houses of parliament, for which he had invented a new method. In 1863 he became paralyzed. He resides at Reeds, Cornwall.

GURNEY, Joseph John, an English philanthropist, born at Earham hall, near Norwich, Aug. 2, 1788, died there, Jan. 4, 1847. He was educated at Oxford under a private tutor, without becoming connected with the university, and in 1818 became a minister of the society of Friends. At different times he travelled through Ireland, the United States and Canada (1837), and most of the countries of central Europe, to inquire into the condition of prisons. In these tours he was generally accompanied by his sister Mrs. Elizabeth Fry, and with her labored for the improvement of prison discipline. Much of his ample fortune was devoted to be-



Web-fingered Gurnard (*Prionotus palmipes*).

eyes, on the top of the head so as to catch all the rays of light, indicate an animal organized for living in comparative darkness.—The American gurnards of the genus *prionotus* are distinguished from those of the preceding genus

nevolent purposes. He published "Notes on Prison Discipline" (1819); "Observations on the Religious Peculiarities of the Society of Friends" (1824); "Essays on the Evidences, Doctrines, and Practical Operations of Christianity" (1827); "Biblical Notes to confirm the Deity of Christ" (1830); "Accordance of Geological Discovery with Natural and Revealed Religion" (1835); "Sabbatical Verses" (1837); "Familiar Sketch of William Wilberforce" (1840); "A Winter in the West Indies, described in Familiar Letters to Henry Clay of Kentucky" (1840); and "Thoughts on Habit and Discipline" (2d ed., 1844). His memoirs, edited by Joseph Bevan Braithwaite, with selections from his journal and correspondence, were published in 1854 (2 vols. 8vo).

GUROWSKI, Adam, count, a Polish author and revolutionist, born at Rusocice in the palatinate of Kalisz, Sept. 10, 1805, died in Washington, D. C., May 4, 1866. Having been expelled in 1818, and again in 1819, from the gymnasia of Warsaw and Kalisz for revolutionary demonstrations, he continued his studies at different universities in Germany. He returned to Warsaw in 1825, and took part in the Polish insurrection of 1830. At its termination he took up his residence in Paris, where he was a member of the national Polish committee, and became conspicuous in political and literary circles. His estates had been confiscated by the Russian government, and he had been condemned to death; but in 1835 he published a work entitled *La vérité sur la Russie*, in which he advocated a union of the different branches of the Slavic race. The idea was regarded favorably by the Russian government, and Gurowski was recalled; and although his estates were not restored to him, he was employed in the civil service. In 1844 he became involved in a quarrel, and left Russia. He spent some time in Germany, and afterward in Switzerland, and for two years lectured on political economy in the university of Bern. He then went to Italy, and in 1849 came to the United States, where he engaged in literary pursuits, and became deeply interested in American politics. From 1861 to 1863 he was employed in the department of state at Washington. Before coming to America he had published *La civilisation et la Russie* (St. Petersburg, 1840); *Pensées sur l'avenir des Polonais* (Berlin, 1841); *Aus meinem Gedankenbuche* (Breslau, 1843); *Eine Tour durch Belgien* (Heidelberg, 1845); *Impressions et souvenirs* (Lausanne, 1846); *Die letzten Ereignisse in den drei Theilen des alten Polen* (Munich, 1846); and *Le Panславisme* (Florence, 1848). During his residence in the United States he published "Russia as It Is" (New York, 1854); "The Turkish Question" (1854); "A Year of the War" (1855); "America and Europe" (1857); "Slavery in History" (1860); and "My Diary," notes on the civil war (3 vols., 1862-'6).

GURWHAL, Gurhwal, or Gurwal, a N. W. district of British India, in the Northwest Prov-

inces, between lat. 30° and 31° 20' N., and lon. 78° and 79° 20' E., bounded N. and N. E. by the Himalayas, which separate it from Thibet; area, about 4,500 sq. m.; pop. in 1871, 309,947. It occupies the S. W. slope of the Himalayas, and includes some of the loftiest peaks of that range. Its surface presents little else than a succession of mountains and deep narrow valleys, among which rise several head streams of the Ganges. Only a small part of the country is cultivated or inhabited. Many of the hills are totally destitute of vegetation, and others are covered with low forests. The chief crop in the low regions is rice. Wheat, barley, buckwheat, battu or amaranthus, pulse of various kinds, oil seeds, the poppy, cotton, sugar cane, and tea are also cultivated. Field labor is performed by women. Horses are rare, asses are unknown, but cattle, sheep, and goats are carefully reared. The greater part of the inhabitants are Hindoos, the remainder being of Thibetan or of mixed Thibetan and Hindoo origin. They are below the middle size, have dark hair and beards, and a lighter complexion than the Hindoos of the plains. Their houses are built of layers of stone and squared beams, and are usually three stories high, the ground floor being occupied by the cattle.—Gurwhal was dependent on some of the more powerful hill states until the reign of Mohiput Shah, who declared himself independent and built Serinagur for his capital. Under the sovereigns of this dynasty the state embraced the district of the Dehra Doon, and about one half of Kumaon. In 1803 it was overrun and devastated by the Gorkhas, and in 1814 was wrested from the conquerors by the British and restored to the family of the former rajah.

GURWOOD, John, an English soldier, born in 1791, died by his own hand in Brighton, Dec. 25, 1845. He entered the British army as ensign in 1808. At the storming of Ciudad Rodrigo, in 1812, he led the forlorn hope, and received the sword of the governor on the surrender of the fortress. He served throughout the whole of that war, and was severely wounded at Waterloo. In 1831 he became private secretary to the duke of Wellington, and in 1841 was raised to the rank of colonel. In 1834 he commenced the publication of "The Despatches of Field Marshal the Duke of Wellington, during his various Campaigns in India, Denmark, Portugal, Spain, the Low Countries, and France, from 1799 to 1818," which extended to 13 vols. 8vo. In return for his services Col. Gurwood received from the duke the appointment of deputy governor of the tower of London. He committed suicide in a fit of insanity from the effects of a wound in the head received at Ciudad Rodrigo.

GURYEY, or Guriev, a town of Russia, in the government and 188 m. E. N. E. of the city of Astrakhan, capital of a circle of the same name, on an island of the Ural, not far from the Caspian sea; pop. in 1867, 2,838. It has

a jail, a river port, manufactories of cotton and linen, distilleries, and fisheries. The inhabitants are mostly Cossacks of the Ural.

GUSTAVUS I., known as **GUSTAVUS VASA**, king of Sweden, born at the castle of Lindholm, May 12, 1496, died in Stockholm, Sept. 29, 1560. He was the son of Eric Johansson, a Swedish senator of the noble house of Vasa, and before his accession to the throne bore the surname of Ericsson. Both his parents were descendants of the ancient kings of Sweden. After having studied at the university of Upsal he entered the service of his kinsman the regent Sturé in 1514, at a period of intense civil commotion. Sweden, which by the compact of Calmar in 1397 became a dependency of Denmark, had declared her independence; but the nobility and clergy were much divided, and the young Gustavus was soon called on to bear arms with his patron against the archbishop Trolle, the leader of the Danish party. In 1517 a Danish army was sent to the archbishop's assistance; but the Swedes defeated it, and Gustavus distinguished himself in the battle. In the following year King Christian II. of Denmark took the field in person. After the Swedish victory of Brännkyrka, Gustavus and five other nobles were given up as hostages for the king's safety during a proposed interview with the regent; but having got them in his power, Christian carried them in chains to Copenhagen. After a year's detention Gustavus escaped, and spent eight months in Lübeck. While there he heard of the regent's defeat and death in battle, and the subjugation by the Danes of all Sweden, except the fortresses of Calmar and Stockholm. Bent upon the liberation of his country, he hastened to Calmar; but the garrison, composed of foreign mercenaries, had resolved to surrender, and he narrowly escaped with life. He then visited some of the southern provinces, and endeavored to rouse the peasants, but met with only threats and insults, and was many times in danger of being arrested. Meanwhile Christian had been acknowledged by the Swedes, and was crowned at Stockholm, Nov. 4, 1520. Four days afterward he caused a massacre of the nobles and populace, including the father of Gustavus. A price was set on the head of the latter, and death was threatened to whoever should assist him. Disguised in rags, he worked for some time as a miner and woodcutter in Dalecarlia, until, deeming the time ripe for his enterprise, he threw off concealment, and harangued the inhabitants. His eloquence, the sturdy patriotism of the Dalesmen, and their hatred for Christian, led 600 men to take up arms and proclaim him "lord and chieftain of the realm;" and in February, 1521, he made himself master of Kopparberg. The people of the coasts declared in his favor; the insurrection spread rapidly, and having defeated the Danes in the battle of Westerås, April 29, and taken several fortresses, he called an assembly of the

states at Wadstena in August, and received from the deputies an offer of the crown, which he refused for the title of administrator. His success from this time was almost uninterrupted, and he was soon acknowledged by most of the nobles and people. Christian threatened him with the death of his mother and two sisters, who were held prisoners at Copenhagen, if he did not disperse his followers; Gustavus refused, and the threat was carried into execution. At length Christian was deposed by his Danish subjects (April, 1523), and his partisans in Sweden gave in their adhesion to Vasa, who accepted the title of king at the diet of Strengnäs, June 7, and entered Stockholm in triumph two weeks afterward. While at Lübeck Gustavus had listened to Martin Luther; he had since corresponded with the reformer, and although he durst not begin his reign with an open profession of the new doctrines, his first measures were directed against the Roman Catholic clergy. Several insurrections were thus excited, which were easily put down. In 1527, at a meeting of the states at Westerås, the king obtained the exclusion of bishops from the senate and their formal subjection to the civil power. The ceremony of coronation, which he had deferred until now rather than take the oath to support the church, was performed at Upsal, Jan. 12, 1528, by the Lutheran archbishop Lars Petri. The reformation now made rapid progress in Sweden; and at a national council held at Örebro in 1529 Lutheranism was adopted as the state religion. Having thus, as he said, "conquered his kingdom a second time," Gustavus formed an alliance with Frederick I. of Denmark against the deposed Christian II., who, having secured the assistance of the emperor Charles V., entered Norway with an army in 1531, and was joined by a number of Swedish malcontents. The troops of Gustavus and Frederick soon forced him to surrender, and the ex-king passed the rest of his life in confinement. Meanwhile the domestic affairs of the kingdom called for the attention of Gustavus. The exactions of the nobles aroused an insurrection of the peasants (1537), who declared their intention "to destroy the nobility, root and branch." In 1542 the rising became general under the lead of Nils Dacke, an escaped criminal, who took the field with 10,000 men. Avoiding a pitched battle, and encouraged by the count palatine Frederick, who gave him a patent of nobility, by the emperor Charles V., and by the duke of Mecklenburg, Dacke held his ground till 1543, when he was killed and his followers dispersed. The disorders caused by the imprudence of the Lutheran pastors were checked, and Gustavus, having at last secured peace at home and abroad, and caused the crown to be declared hereditary in his family, devoted himself to administrative reform. In 1555 a war broke out with Russia, and was continued with varying success until the peace of Moscow, in April, 1557. The last years of the king's life were embittered by

domestic troubles, arising chiefly from the evil propensities of his son Eric. Gustavus was thrice married: first to Catharine of Saxe-Lauenburg, the mother of his son and successor Eric; secondly to Margaret de Laholm, the daughter of a Swedish noble; and thirdly to Catharine Stenbock, niece of Margaret.

GUSTAVUS II., Adolphus, king of Sweden, sixth of the line of Vasa, son of Charles IX. and Christina of Schleswig-Holstein, born in Stockholm, Dec. 9, 1594, killed at Lützen, Nov. 6 (new style 16), 1632. His father was the youngest son of Gustavus Vasa, and had been called to the throne on the exclusion of his nephew Sigismund, king of Poland, who was the rightful heir, but had given umbrage to the states by professing the Roman Catholic religion. (See CHARLES IX. of Sweden.) Sigismund had made an alliance with Russia for the recovery of the Swedish crown, and Gustavus Adolphus, on the death of his father, Oct. 30, 1611, inherited a war with the Poles and Russians, besides a long standing hostility with the Danes. Securing the assistance of his nobles by confirming their privileges, he made a peace with Denmark on favorable terms, and then, turning his arms against the Russians, drove them from Ingria, Karelia, and part of Livonia. He made a treaty with the czar at Stolbova in 1617, by which he retained much of the conquered territory, and was then in a condition to prosecute the Polish war with greater advantage. He overran the Baltic coast from Riga to Dantzic, made himself master of a large part of Polish Prussia, defeated the Poles in several engagements, but was repulsed and wounded before Dantzic, and on Sept. 30, 1627, fought a bloody but indecisive battle. The emperor Ferdinand II. now took part in the contest, placed Gustavus under the ban of the empire, and sent 10,000 men under Wallenstein into Pomerania. The Swedes, however, continued victorious, and by the mediation of France and England a truce for six years was concluded in September, 1629, on terms highly favorable to Gustavus. Meanwhile the expense of the war had raised several seditions at home, which the king put down by alternate mildness and severity. Leaving the care of his kingdom to the chancellor Oxenstiern, Gustavus now turned his attention to fresh foreign conquests. The growing power of Austria on the Baltic, the affront put upon him by Ferdinand in the late war, and the danger that threatened the Protestant cause in the great religious contest which then divided Germany, joined to an ambition to aggrandize his country, induced him to declare war against the emperor; and having presented to the states assembled at Stockholm his daughter Christina as the heiress of his throne, he set sail with about 20,000 men, and landed at the mouth of the Oder, June 24, 1630. By July 10 he had seized almost the whole of Pomerania. He levied a heavy contribution in this province, disciplined his troops, taught them a new system of tactics, and then, having

received an accession of six Scottish regiments under the duke of Hamilton, led a division of his army into Mecklenburg. Ferdinand, who at first looked with contempt upon the movements of this "king of snow," now proposed a truce; but Gustavus preferred to follow up his successes, and in eight months from the time of his landing he had taken 80 fortified places. The imperialists under Tilly and Pappenheim gained several successes, but many of the Austrian magazines fell into the hands of the Swedes; and Gustavus, having first carried Frankfort-on-the-Oder by assault, pushed on toward Magdeburg, which Tilly was then investing. Before he could reach it the city was stormed, and more than 25,000 of the inhabitants were massacred. In September, 1631, Gustavus was joined by the elector of Saxony, with whom he at once gave battle to Tilly, and defeated him at Breitenfeld, near Leipsic, Sept. 7. This signal victory over a general never vanquished before, which displayed the superiority of the king's mode of fighting, based on boldness of attack and celerity of movement, at once established his reputation as a general. The Protestant states now hailed him as their leader. The elector of Saxony carried the war into Bohemia, while Gustavus marched into Franconia and the Palatinate, defeated Tilly again at Würzburg, and wintered at Mentz. Oxenstiern would have had him attack Vienna, but Gustavus, anxious to appear not as a conqueror, but as the liberator of the Protestants, had resolved to confine the operations of his armies to the N. and W. provinces. Ferdinand now determined to recall Wallenstein, who had been dismissed about the time of the Swedish landing; but before he could obey the summons Gustavus had attacked the Austrians at the river Lech (April, 1632), and had driven them into Ingoldstadt. Tilly was mortally wounded in the action. Munich surrendered to the Swedes in May; almost the whole of Bavaria was in their hands, and the elector was forced to take refuge in Ratisbon. The Lutheran peasants of Upper Austria took up arms; the Swiss granted permission to the king to raise levies in their territory, and the Swedish standard was carried triumphantly by Bernhard of Saxe-Weimar to Lake Constance and the Tyrolese mountains. At this juncture Wallenstein appeared at the head of 40,000 men, drove the Saxons from Bohemia, entered Prague on May 4, effected a junction with the elector of Bavaria at Eger on June 11, and thence advanced toward Nuremberg, where he found Gustavus entrenched. The hostile armies remained in sight of each other for three months, each endeavoring to conquer by famine and disease. At last Gustavus, having made an unsuccessful attempt to storm the position of the enemy, retired toward the upper Danube, and in November entered Saxony, where Wallenstein was spreading carnage and desolation. On the 5th he found himself face to face with the enemy at Lützen, with 12,000 foot and

6,500 horse under his command; Wallenstein's army is believed by good authorities to have been considerably superior in numbers. The night was spent in preparation for battle. The morning of the 6th broke foggy, and when the mists rose, about 10 o'clock, the Swedes were seen kneeling in their ranks. They sang Luther's hymn, *Ein' feste Burg ist unser Gott*, and a hymn composed by the king, and then charged the enemy, Gustavus leading the right wing and Bernhard of Weimar the left. The imperialists were driven from their strong intrenchments, but meanwhile Pappenheim arrived with a body of cavalry from Halle, and the Swedes were turned back in confusion. Gustavus rallied them, and with a small body of horse rode forward to support the infantry in a fresh attack; but approaching too near a squadron of imperial cuirassiers, he received a shot in the arm, and as he turned to be led away another in the back which caused him to fall from the saddle. His horse, which had been wounded in the neck, dragged him some distance by the stirrup, and galloping riderless back to the ranks roused the Swedes to fury. Led by Bernhard of Weimar, they rushed forward with an impetuosity which nothing could resist. Pappenheim fell mortally wounded, and Wallenstein at last ordered a retreat. The dead body of the king was found covered with wounds. After having been embalmed at Weissenfels, it was carried to Stockholm, and there interred in the church of Riddarholms. It was believed that the duke of Saxe-Lauenburg, the king's cousin, who was with him when he fell, and a few days afterwards went over to the Austrians, inflicted the wound in the back of which Gustavus died.—Gustavus inherited the commanding presence, eloquence, and accomplishments of his grandfather. He aimed at great conquests, but the extent of his ambition can hardly be conjectured. He owed his success in battle to strict discipline and the ardor with which he inspired his soldiers. His magnanimity, clemency to the vanquished, and respect for the religious opinions of others, compelled the esteem of his enemies. Though eminently a warlike king, he devoted much time to the internal affairs of Sweden; he encouraged commerce and manufactures, made excellent regulations for the mines, and endowed the university of Upsal. He is regarded as the Protestant hero of Germany, and in 1832, on the 200th anniversary of his death, was founded the "Gustavus Adolphus union." Up to the close of 1868 this society had expended about 2,325,000 thalers in the support of new and poor Protestant congregations. Gustavus was married in 1620 to Maria Eleonore of Brandenburg, whose court he had visited in disguise for the purpose of choosing a wife. Their daughter Christina was his successor.

GUSTAVUS III., king of Sweden, eldest son and successor of King Adolphus Frederick and Ulrica Louisa, princess of Prussia, born in

Stockholm, Jan. 24, 1746, died there, March 29, 1792. He was educated under the superintendence of Counts Tessin and Scheffer. His ambitious tendencies early awakened the anxiety of these noblemen, who vainly attempted to restrain and correct his disposition. On his accession to the throne, Feb. 12, 1771, the state was divided between two sordid and corrupt factions. They were the "Hats" and "Caps," or "France and Commerce," against "Agriculture and Russia." Under Adolphus the Hats had obtained the predominance, and proposed to subvert the constitution by force, and to rescue the country from the domination of the nobles. Gustavus, who at the time of his father's death was travelling on the continent, procured from the French government a promise of aid and support against the aristocratic party. Hastening to Sweden, he labored to obtain popularity, while his emissaries propagated disaffection to the diet. Having matured his scheme, Gustavus confided the secret to a favorite officer, Hellichius, who shut the city gates of Christianstad, and published a manifesto against the diet. The place was immediately invested by government troops, while Stockholm was declared under martial law. Gustavus, having secured the support of the troops, posted a guard over the assembled senators, harangued the people on the great square, entered the hall with a strong guard, and produced a new constitution, which was immediately approved and confirmed by subscription and oath. The diet acquiesced; and thus, on Aug. 21, 1772, without the loss of a single life, a revolution was accomplished. The government he created was better than that of the oligarchy he had overthrown, though the royal power was increased. In 1783 he went abroad again, visited Italy, and passed some time in Paris. During his absence a famine made great havoc, the people were disturbed, the nobility rose against him, and the diet forced him to make concessions. The king, who in 1772 was the idol of the nation, had become in 1787 an object of detestation. War was now employed to stimulate loyalty. Gustavus secretly ordered a march upon St. Petersburg, and, having quelled an uprising of the nobles, secured extraordinary powers, and at the head of a body of Dalecarlian peasants repulsed the Danes who menaced Gothenburg, he began in person a vigorous campaign against Russia. The war continued with varying success for upward of two years, and was terminated by a peace on terms honorable to Gustavus after the Swedish naval victory of Swenkasund, July 9-10, 1790. Dissatisfied, however, with the result of the war, he resolved to take part in restoring the power of Louis XVI., and aimed at heading a Swedish, Russian, Prussian, and Austrian coalition for the invasion of France. He went to Spa and Aix-la-Chapelle to concert measures, but before his plans were matured he was shot at a *bal masqué* in Stockholm by Anckarstroem, the instrument of a conspiracy

of nobles. Gustavus lingered 13 days after receiving the fatal shot. He was a man of great ability, but capricious and insincere. He was the author of dramatic works and lyric poems, published in Swedish in Stockholm in 1806-'12 in 6 vols., and also in French. On June 23, 1788, before his departure for the Finnish war, he deposited two boxes in the library of Upsal, requesting that they should only be opened 50 years after his death. They were opened March 29, 1842, and found to contain historical and literary essays and letters, which were published by Geijer (3 vols., Upsal, 1843-'6), and translated into German.

GUSTAVUS IV., Adolphus, king of Sweden, only son of the preceding, born Nov. 1, 1778, proclaimed king March 29, 1792, died Feb. 7, 1837. He was declared of age on completing his 18th year, Nov. 1, 1796. He had been betrothed at an early age to a princess of Mecklenburg, but Catharine II. of Russia planned a marriage for him with her granddaughter Alexandra. Gustavus accepted an invitation to visit the imperial court, and was received with splendid hospitality. The princess possessed great beauty and wit, and he fell in love with her. The marriage was about to be solemnized, and the empress upon her throne, the court collected in state, and the young bride all awaited the appearance of the groom. At the latest hour he had been permitted to examine the marriage contract, and found that it pledged him to declare war against France, and to permit his queen to remain in the Greek church. He forthwith rejected the alliance, returned immediately to Stockholm, and became next year the husband of the princess Friederike of Baden, from whom he was divorced in 1812. With the czar Paul, who succeeded Catharine, he negotiated the renewal of the armed neutrality. After the murder of Paul, his successor Alexander lost no time in making peace with England. Gustavus and Alexander alone among the sovereigns of Europe protested against the execution of the duke d'Enghien; and in the Germanic diet, in which Gustavus as duke of Pomerania had a voice, he inveighed boldly against the French emperor. Napoleon replied in the *Moniteur*, reproaching Gustavus with having deserted the Danes, and satirizing the young king as the heir of Charles XII. only in "jack boots and audacity of tongue." Gustavus had early assumed the dress and professed to imitate the spirit of Charles. The French minister was peremptorily dismissed from Stockholm, and French newspapers were forbidden the kingdom. The king soon after took the field in person against Bernadotte, who occupied Hanover with 30,000 troops. Austerlitz and the peace of Presburg obliged him to retreat, and the campaign was confined to unimportant skirmishes in Prussia. The peace of Tilsit was forced upon Russia and Prussia; and Gustavus alone upon the continent of Europe held out against the French empire. Napoleon at-

tempted to dazzle the young king with visions of Norway; but his overtures were rejected, and Gustavus was driven across the Baltic. Robbed of Pomerania, he was now to be despoiled of Finland. Napoleon and Alexander having come to an understanding at Erfurt for the partition of Sweden, Caulaincourt announced to his diplomatic colleagues at St. Petersburg that "Gustavus IV. had ceased to reign." Supported by England with a subsidy for one year of £1,200,000, and the assurance of auxiliary troops, Sweden presented a bold front. A Russian army overran Finland; but Gustavus quarrelled with Sir John Moore, who had come to his assistance with 10,000 English troops; he forbade their landing, and the English general returned home in disgust. With more than 100,000 Swedes under arms, Gustavus managed never to have 10,000 together; and these he exhausted in continued forced marches, now threatening a descent upon Denmark, now upon Norway, and again hurrying across the whole breadth of Sweden to renew the war in Finland. The English minister was instructed to release Sweden from her English obligations, if she should find her necessities such as to render concessions inevitable. In return, Gustavus, without consulting his cabinet, sent a despatch to Gothenburg subjecting the British shipping in that harbor to an embargo. Next morning he recalled the order, and offered a renewal of alliance with England on the same subsidiary basis. His mismanagement was long attributed by the people to the incapacity of his council; but the truth could not be always concealed; his insanity was apparent, and his deposition was evidently necessary. A plot soon took form and order, and it was resolved by a band of resolute nobles to offer the crown to the English duke of Gloucester. The offer was made, but not accepted. A body of troops marched upon Stockholm, and Baron Adlercrentz accepted the charge of arresting the king, who was imprisoned in the castle of Gripsholm, while his uncle, the former regent, was placed at the head of affairs, with the title of protector, but was soon after elected king as Charles XIII. Gustavus in the mean while resolved to anticipate the decree of dethronement by abdication, which he did in a document dated March 29, 1809. The diet assembled, solemnly renounced allegiance, and declared the heirs of his body for ever excluded from the throne. The exiled family proceeded, about eight months after the king's arrest, in a Swedish frigate to Germany, Gustavus having assumed the title of count of Gottorp. The Swedish government settled upon him a pension equivalent to \$26,000. Charles XIV. (Bernadotte) subsequently obtained from the diet authority to adjust equitably all money affairs between Sweden and the exiled Vasa family, and paid over to the Russian emperor, the brother-in-law of Gustavus and the guardian of his children (the father having separated himself from his wife and family),

the value of his private estates, about \$600,000, which was transmitted as a private fortune. In 1810 Gustavus visited England, where he lived at Hampton Court, and found companionship among the royal exiles of France. In 1812 he went to Denmark, where he assumed for a time the title of duke of Holstein. He subsequently wandered about Europe, often in great need, for he proudly refused the Swedish pension. His wife and children often devised means of secretly placing in his way what appeared to be necessary for his support. During the later years of his life he appeared in threadbare garments, seeming to glory in privations and poverty. He became a resident of the canton of Basel, and died at length in a humble abode at St. Gall. In 1828 his son Gustavus (born Nov. 9, 1799) ineffectually memorialized the courts of Europe in support of his claim to the title of prince of Sweden, and, upon the death of his father, to the style and dignity of king. The claim was again publicly renewed in 1859, on the death of King Oscar.

GÜSTROW, a town of Germany, in the grand duchy of Mecklenburg-Schwerin, on the Nebel, and on a branch of the Schwerin and Rostock railway, 22 m. S. of Rostock; pop. in 1871, 10,575. It has several churches, among them a cathedral built in the 13th century, a former castle which is now a state workhouse, a gymnasium and other literary institutions, a hospital, manufactories of tobacco and machines, iron foundries, tanneries, and breweries. Horse races and cattle shows are held annually.

GUTENBERG, Johann, or Henne, the reputed inventor of printing, born in Mentz, Germany, about 1400, died there, Feb. 24, 1468. His father's name was Gensfleisch or Gansfleisch, Gutenberg being the name of his mother, or that of an estate which belonged to the family. His family was of noble lineage, and he occupied a respectable position in his native city, from which, however, civic dissensions caused him with many others to migrate in 1420. He became a citizen of Strasburg, where he appears to have devoted many years to mechanical experiments of various kinds. In 1436 he entered into a contract with Andrew Dritzehn and others of that city for the purpose of practising in partnership, and for the common benefit, all his secret and wonderful arts. Three years later he was sued by the brother of Dritzehn, who had died in the interval, for money due the latter by the terms of his contract; and in the course of the trial it was shown that among the wonderful arts which Gutenberg was to reveal to his associates was printing, and that as early as 1438 he was in possession of a press, movable types, forms, and other appliances of the art. As he never affixed his name to the title pages of his books, it is not certain that he produced any printed works at Strasburg. After 1444 all trace of him is lost till 1448, when he was again in Mentz. In August, 1450, he entered into a partnership with Johann Faust of Mentz for the purpose of carrying on

the business of printing, the latter undertaking to furnish the funds. The partnership terminated at the end of five years, Faust having in a suit for moneys advanced obtained possession of most of the materials of the business. With such as remained to him Gutenberg established himself in the house *zum Gutenberg*, belonging to his mother, where he appears to have carried on printing with considerable activity, and to have associated himself with a Doctor Conrad Homery, who afterward came into possession of the stock. In 1465 Gutenberg abandoned printing, and entered the service of the elector Adolphus of Nassau as a gentleman of the court, with a suitable compensation. The number and character of the works printed by him, or with his coöperation, have afforded a fruitful subject of controversy, and by many it has been maintained that his merit was altogether that of an experimenter. In his own and in modern times he has to a certain extent been obliged to share with Faust and Peter Schöffer the credit of his invention; and so obscure are many passages of his history that his name has almost been considered a myth. Schöffer in several instances publicly claimed the invention for himself, and also for his father-in-law Faust; but in the preface to a German translation of Livy, published in Mentz in 1505, it is distinctly stated by his son Johann Schöffer that the "admirable art of printing was invented in Mentz in 1450 by the ingenious Johann Gutenberg, and was subsequently improved and handed down to posterity by the capital and labor of Johann Faust and Peter Schöffer." The testimony of his contemporaries and the opinion of most modern writers seem to agree, however, that Gutenberg not merely invented the art, but practised it for many years previous to his death, and long before he became associated with Faust. Zell, a contemporary writer, mentions a *Catholicon*, and one or more editions of the Donatus, possibly printed at Strasburg, of the former of which no copy remains. Another *Catholicon*, called the *Catholicon Joannis Januensis*, was published by Gutenberg in Mentz in 1460. During the partnership with Faust appeared the "Letters of Indulgence," the "Appeal against the Turks," and the well known Mazarin Bible, their joint production; and of the celebrated Psalter, published by Faust and Schöffer in August, 1457, within 18 months after the separation from Gutenberg, and containing their imprint, much of the work was undoubtedly done by the latter. In addition to these, the "Calendar for 1457," the *Hermann's de Saldis Speculum Sacerdotis*, published about 1457, and the *Celebratio Missarum*, have been ascribed to him, although Dr. Dibdin thinks very doubtfully of the two latter, as well as of the Donatuses, and is inclined to consider the *Catholicon* of 1460 and the "Vocabularies" of 1467-9 more genuine specimens of his press or of the types used by him. The other works sometimes ascribed to Gutenberg

are of very doubtful authenticity. In 1540, a century after the invention of printing, the city of Wittenberg first publicly celebrated the event. The example was followed in the succeeding century by Strasburg, Breslau, and Jena, and many cities of Germany have since held centennial jubilees in honor of Gutenberg and his invention. In 1837 a statue of him in bronze by Thorwaldsen was erected in his native place, and in 1840 Strasburg, the birthplace of the art, inaugurated with great pomp one by David d'Angers.—The chief authorities on the life of Gutenberg are: *Essai d'annales de la vie de Gutenberg*, by J. G. Oberlin (Strasburg, 1801); *Essai sur les monuments typographiques de Gutenberg* (Mentz, 1802), and other works, by M. G. Fischer; *Eloge historique de Jean Gutenberg*, by Née de la Rochelle (Paris, 1811); *De l'origine et des débuts de l'imprimerie en Europe*, by Auguste Bernard (2 vols., Paris, 1853); *Essai historique de Gutenberg*, by J. P. Gama (Paris, 1857); and Lamartine's memoir, *Gutenberg l'inventeur de l'imprimerie* (12mo, Paris, 1853). See also an article giving a summary of the facts and the arguments which the life and works of Gutenberg have evolved, by Ambroise Firmin-Didot, in the *Nouvelle biographie générale*.

GUTHRIE, a S. W. county of Iowa, drained by the middle fork of Raccoon river; area, 576 sq. m.; pop. in 1870, 7,061. The soil is fertile. The Chicago, Rock Island, and Pacific railroad intersects the S. part. The chief productions in 1870 were 164,012 bushels of wheat, 447,380 of Indian corn, 73,827 of oats, 12,873 of potatoes, 120,390 lbs. of butter, 35,180 of wool, and 10,405 tons of hay. There were 2,692 horses, 2,077 milch cows, 3,552 other cattle, 9,480 sheep, and 8,599 swine; 3 saw mills, and 2 woollen factories. Capital, Panora.

GUTHRIE, Thomas, a Scottish clergyman, born at Brechin, Forfarshire, July 12, 1803, died at St. Leonards, Fifeshire, Feb. 24, 1873. He was educated at Edinburgh, and was licensed to preach in 1825. He afterward studied medicine in Paris, and on his return to Scotland was for a time employed in his father's banking house. In 1830 he was ordained pastor at Arbirlot near Arbroath, and in 1837 was transferred to the old Greyfriars church, Edinburgh. Here he became very popular among all classes, exerted himself to reach the masses of the people, and opened the old Magdalene chapel in the Cowgate, giving the poor residents of the neighborhood the preference in seats. Greyfriars was a collegiate church, and in 1840 the separate parish of St. John's was erected for him. The new building was arranged with especial reference to the wants of the poor, but was hardly occupied when in 1843 the disruption of the church of Scotland took place. In the discussions which led to that event Dr. Guthrie had taken a prominent part, and he now coöperated with Chalmers, Candlish, and Cunningham in the organization of the Free church. In 1845 the work of building manse

throughout the church was put under his care. For some time after the disruption his congregation met in a Methodist chapel, but subsequently St. John's Free church was built for him. He sought to open in the basement of his church a ragged school, but being opposed by the elders of the congregation he undertook a larger work, apart from the supervision of any particular church or denomination. About this time he published his "Plea for Ragged Schools," which was many times republished, and his ragged school became the pioneer of many like schools. He was also active in the temperance reform. In 1848 he was obliged on account of impaired health to have a colleague, and Dr. William Hanna was chosen to the place. In 1864 Dr. Guthrie was forced to give up public speaking, retired from the pastorate, and became editor of the "Sunday Magazine," then just starting. In October, 1872, he was again prostrated by sickness, and in February, 1873, went to St. Leonards in the hope of relief, but a fatal attack almost immediately ensued. Dr. Guthrie was remarkably eloquent both as a pulpit and platform speaker. He published about 20 volumes, mostly collections from his sermons, or republications from "Good Words" and the "Sunday Magazine." Among the most famous of these are "The Gospel in Ezekiel," "The Saint's Inheritance," "The Way to Life," "On the Parables," "Out of Harness," "Speaking to the Heart," "Studies of Character," "The City and Ragged Schools," "Man and the Gospel," and "Our Father's Business." His works have been republished in America, including his "Autobiography and Memoir," by his sons (1874).

GUTHRIE, William, a Scottish author, born in Brechin about 1708, died in London in 1770. He studied at Aberdeen, and for some time was a schoolmaster, then went to London and became an author and compiler, and from 1746 was pensioned by government. His most important works are: "General History of England" (3 vols. fol., London, 1744-'50); "General History of Scotland" (10 vols. 8vo, 1767-'8); "General History of the World" (12 vols. 8vo, 1764-'7); a "Peerage," and a "Geographical, Historical, and Commercial Grammar," of which numerous editions in all sizes appeared, the 1st in 1770, the 24th in 1827, 4to. Among his other works is "The Friends, a Sentimental History" (2 vols. 12mo, 1754).

GUTS-MUTHS, Johann Christoph Friedrich, founder of the German system of gymnastics (*Turnwesen*), born in Quedlinburg, Aug. 9, 1759, died at Schnepfenthal, May 21, 1839. In 1779 he entered the university of Halle, where he passed three years in the study of theology. In 1786 he was employed to superintend the gymnastic exercises of the Schnepfenthal institute. He published *Gymnastik für die Jugend* (Schnepfenthal, 1793); *Spiele zur Uebung und Erholung des Körpers und Geistes für die Jugend* (1796); *Kleines Lehrbuch der Schwimmkunst* (Weimar, 1798); *Turnbuch für die*

Söhne des Vaterlands (Frankfort, 1817); *Handbuch der Geographie für Lehrer* (Leipsic, 1810); and *Methodik der Geographie* (1835).

GUTTA PERCHA (Malay, *gutta*, gum, and *percha*, the name of a tree), an inspissated juice called *gutta taban* by the Malays, the name being misapplied by the English. The tree which produces the gum was referred by Sir W. J. Hooker in 1847 to the natural order *sapotacea* and Dr. Wight's new genus *isonandra*, and named the *isonandra gutta*. It was formerly abundant in the forests along the foot of the hills in the Malayan peninsula, but the natives by cutting down the trees to procure the juice exterminated the plant, and the supply now comes from Borneo and other islands of the Indian archipelago. It is a large tree, commonly 3 to 4, but sometimes 6 ft. in diameter, with a straight trunk and reaching the height of 60 or 70 ft. The branches are numerous and ascending, and crowded with leaves at their extremi-



Gutta Percha (*Isonandra gutta*).

ties; these are petiolate, oblong, 4 or 5 in. long and 2 wide, of bright green above and brownish beneath. The flowers are small and white. The wood is peculiarly soft, fibrous, and spongy, pale colored, and traversed by longitudinal receptacles filled with the gum, forming ebony-black lines. To the Malays the valuable properties of the juice of the tree were known long before the Europeans became acquainted with the article. The natives found that the gum would become soft and plastic in hot water, and, being then moulded into any form, would retain this when cold. They made it into basins, vases, shoes, elastic sticks, whips, handles for *parangs* or axes, &c. The attention of Europeans was first called to it in 1842 by Dr. William Montgomerie, assistant surgeon to the residency at Singapore; and in 1843 Dr. D'Almeida of the same place brought specimens of the gum to England and laid them before the royal Asiatic society. They attracted little

attention till further communications from Dr. Montgomerie established the importance of the article by showing its applicability to the same uses as caoutchouc, and to others besides, and also the low cost at which the material could be procured in the greatest abundance. In 1844 a shipment of 2 cwt. was made from Singapore as an experiment, and soon after the product suddenly became a commercial article of importance. In 1847 Dr. Oxley published an interesting account of the tree and its product in a Singapore journal, describing the uses to which he had applied the gum for surgical instruments. He stated that the large trees which were formerly very abundant on the island of Singapore had been nearly all cut down by the natives, who adopted this destructive method of obtaining the juice, and who had sacrificed by his estimation 69,180 trees to procure one tenth this number of piculs, which was the exportation from Jan. 1, 1845, to July, 1847. The custom of tapping has since been introduced. The sap soon coagulates after it is collected, or it is made to do so by boiling, and is then kneaded by hand into oblong masses, 7 to 12 in. long and 4 or 5 broad. Its dark reddish brown color is derived from the impurities, as bits of the bark, that have accidentally fallen into the juice, or from sawdust and other substances introduced as adulterants.—Purified gutta percha has a brownish red color and a density of 0.979. It is a non-conductor of electricity, and by friction with almost any other substance (gun cotton and collodion are exceptions) it develops negative electricity. At ordinary temperatures it has considerable tenacity, being nearly as strong as leather, but much less flexible. When heated to 115° F. it becomes pasty, and between this and 140° or 150° it may be moulded into various shapes or drawn out into wires or tubes. It is insoluble in water, and slightly soluble in anhydrous alcohol and anhydrous ether, but soluble in boiling olive oil, from which it is deposited on cooling. Benzene, sulphide of carbon, chloroform, and oil of turpentine dissolve it with the aid of heat. It is insoluble in alkaline solutions or hydrochloric and hydrofluoric acids, and therefore may be advantageously used as a material for vessels to contain these liquids. Strong sulphuric acid carbonizes it, and nitric acid oxidizes it, converting it to a yellow resin. Gutta percha is remarkably porous. If a thin film be deposited upon a plate of glass or porcelain from its solution in sulphide of carbon, when examined with the microscope it will be found full of minute pores. When subjected to traction it becomes fibrous, and will then resist a much greater force without extension. Pure gutta percha is a hydrocarbon, having the formula $C_{20}H_{32}$. When exposed to light and air it slowly absorbs oxygen, and is converted into a white resin, having the composition $C_{20}H_{32}O_2$, and a yellow, $C_{20}H_{32}O$, both of which are soluble in boiling alcohol. The purified commercial article usually con-

tains from 75 to 82 per cent. of pure gutta, the remainder being composed of the two resins just mentioned.—The treatment of gutta percha is similar to that already described under *CAOUTCHOUC*. The first process is to purify it of the foreign substances, as earth, stones, and sticks, with which it is contaminated. For this purpose the blocks are sliced, by knives attached to powerful wheels, into shavings. These are introduced into a large tank of water heated by escape steam to boiling. The gum softens and runs together, and by the boiling most of the impurities separate and subside. The mass is then removed to a machine called a teaser, which is a large box containing a drum armed with rows of crooked teeth. This, revolving rapidly, tears the gum into shreds, which fall into a vessel of water, in which it floats, and the remaining impurities subside. The purified fragments are again boiled; they again run into a soft mass, and this is taken into the kneading or masticating machine, which is a strong cast-iron box containing a revolving cast-iron drum armed with strong iron teeth; or instead of the drum, two parallel rollers with screws on their surface are employed. Steam is let into the machine, and the gutta percha, kept soft by its heat, is thoroughly kneaded and brought to uniform consistency without air or water in the mass. It is then ready to be rolled into sheets or pressed into tubes; the former in their various sizes and thicknesses furnish the article in shapes convenient of application to most of the uses to which it is adapted. Tubes are produced by forcing the kneaded mass through a steel cylinder which terminates in a mould with a circular metallic core. Passing through this, the soft substance is prevented from collapsing by being drawn through a long channel of water by the revolution of a drum at the other extremity of the canal. By continually supplying the material the tubes are made without interruption; and in this way a single length has been produced of 1,000 ft. These tubes by their remarkable strength are well adapted for resisting great pressures; they are used for aqueducts, for feed pipes of steam engines, for hose, pump barrels, and various other purposes connected with the conveyance of water, gases, and vapors. The first machinery built for the coating of telegraph wire with gutta percha was in the autumn of 1848, at the works of the American gutta percha company in Brooklyn. The first order for the prepared wire was for the Morse telegraph company, and it was laid across the Hudson river at Fort Lee in August, 1849. The gutta percha employed was prepared with the greatest care to insure its purity. The raspings, rolled and then macerated in hot water, were washed in cold water, and then, being softened by boiling water, were driven by hydraulic apparatus through cylinders, in the end of which were wire-gauze sieves. After this the substance was thoroughly masticated and

kneaded, by which it was entirely deprived of moisture and rendered homogeneous and compact; and it was then introduced into the long horizontal cylinders kept hot by steam, and powerfully compressed by screw pistons worked by machinery. As it was forced out at the extremity the gutta percha was made to pass through a die, in which the strand of copper wires was introduced, and the whole was drawn along by a revolving drum upon which it was wound. A second and third layer of gutta percha were added to the core by repetitions of the process. Mr. Charles Goodyear applied the same process to moulding various articles in gutta percha, attaching the moulds, which were of metal in several pieces securely bolted together, to the end of the cylinder, through which the plastic gum was forced. Holes were left for the escape of the air in the moulds, and the appearance of the gutta percha at these indicated the completion of the filling.—Gutta percha is often used in combination with caoutchouc, the latter serving to soften and render the material more pliable and elastic, and less liable to be affected by changes of temperature. Both are alike affected by the treatment called vulcanizing, which is thoroughly mixing the gum with sulphur or some of its compounds, and then subjecting the mixture to an elevated temperature in close vessels. (See *CAOUTCHOUC*.) The methods and materials employed for vulcanizing gutta percha are numerous, and the object desired is not always the same. A hard horny material is produced under the patent of Mr. Stephen Moulton, by mixing the gum with hyposulphite of lead and adding more or less of calcined magnesia, and then subjecting the compound to a temperature of 250° to 300° for some hours. Mr. Hancock in his patent of 1847 employed a mixture of 48 parts of gutta percha with 6 parts of sulphuret of antimony, sulphuret of calcium, or some other similar sulphuret, and 1 part of sulphur. Mr. Emory Rider of London in 1856 patented an improvement which consisted in the addition of 1 part of litharge to 66 parts of gutta percha, together with 1 part of sulphur, or its equivalent in some of its compounds. These substances are mixed and well incorporated into the plastic gum by the action of heated rollers, which, revolving at different speeds, powerfully wear and grind the material; after which, in a close metallic vessel one third filled, it is subjected to the vulcanizing temperature for a few hours. The patents for mixing gutta percha with other substances are too numerous to be particularly noticed; even these substances are almost innumerable. The object of these various mixtures is to produce materials of different degrees of hardness and of different capacities of resistance to changes of temperature and other causes of change, but which may still be moulded into and retain the form of useful articles. The principal use of gutta percha is for covering telegraph cables. It is also used by den-

tists for taking impressions of the teeth and gums, and sometimes for a temporary filling for cavities. Baths and other articles for chemical laboratories, as funnels and tubing, may also be advantageously made of it. Many articles sold under the name of gutta percha are compositions of caoutchouc with other substances.

GUTZKOW, Karl Ferdinand, a German author, born in Berlin, March 17, 1811. While studying theology and philosophy at the university, he published in 1831 *Forum der Journalliteratur*. His next work was a novel, *Maha Guru, Geschichte eines Gottes* (1833). He became associated as a journalist with W. Menzel at Stuttgart, and published *Novellen* (2 vols., 1834), and *Soiréen und Oeffentliche Charaktere* (1836). His drama *Nero*, his preface to Schleiermacher's letters on Friedrich von Schlegel, and his novel *Wally, die Zweiflerin*, all appearing in 1835, confirmed his reputation as the head of "Young Germany." For the last named work (which was reprinted in 1852 under the title *Vergangene Tage*) he was imprisoned for three months at Mannheim, his former friend Menzel and other influential writers denouncing the tendency of his writings as inimical to religion and society. While in prison he wrote *Zur Philosophie der Geschichte* (1836), in opposition to Hegelianism, and next went to Frankfurt, where he was married. To elude the censorship, he published *Die Zeitgenossen* (2 vols., 1837, subsequently included in his works under the title *Säkularbilder*) under the name of Bulwer; and in order to enjoy greater literary freedom he removed to Hamburg in 1838. Here he wrote, besides others, one of his most characteristic humorous and satirical novels in the vein of Jean Paul Richter, *Blasedow und seine Söhne* (3 vols., 1838-'9) and *Börne's Leben* (1840). Here he also opened a new era in the German drama by his tragedy *Richard Savage* (1840) and by many other plays, including his most popular comedies, *Zopf und Schwerdt* (1844) and *Das Urbild des Turtufe* (1847), and his most admired tragedy, *Uriel Acosta* (1847). He edited the *Telegraph für Deutschland* till 1842, when, after a visit to Paris, which he described in his *Briefe aus Paris* (2 vols., 1842), he left Hamburg to supervise at Frankfurt a complete edition of his works (12 vols., 1845-'6). In 1847 he succeeded Tieck as dramatist at the Dresden theatre, and from 1852 to 1862 he edited at Frankfurt the weekly journal *Unterhaltungen am häuslichen Herd*. His fame as the foremost German novelist of his day was established by *Die Ritter vom Geiste* (9 vols., 1850-'52), *Die Diakonissin* (1855), *Der Zauberer von Rom* (9 vols., 1859-'61), and *Die kleine Narrenwelt* (3 vols., 1856). In 1862 he became chief secretary of the Schiller institution at Weimar. In 1864 he made an attempt on his life at Friedberg, near Giessen, in a fit of insanity, from which he recovered after a time, and resumed his literary activity by the publication of various works, including the novel

Hohenschwangau (3 vols., 1868). After taking up his residence in Berlin in 1870 he published *Lebensbilder* (3 vols., 1870-'72); *Die Söhne Pestalozzis* (3 vols., 1870), the plot of which is connected with the story of Kaspar Hauser; and *Fritz Ellrodt* (3 vols., 1872).

GÜTZLAFF, Karl, a German missionary, born in Pyritz, Pomerania, July 8, 1803, died in Victoria, Hong Kong, Aug. 9, 1851. He was born of poor parents, and was apprenticed to a belt maker at Stettin. A sonnet which he addressed to the king of Prussia led to his being admitted as a student into the missionary institute at Berlin. His first appointment was from the Dutch missionary society at Rotterdam, which sent him to Batavia in 1826. There he married a rich English lady, and during the two years that he remained in Java he mastered the Chinese language. He then determined to go on his own account to China. Happening in the summer of 1828 to fall in with an English missionary named Tomlin, stationed in Siam, he went with him to Bangkok, where he stayed three years learning the Siamese language, and assisting Tomlin to translate the New Testament into that tongue. Proceeding thence to China, he fixed his residence at Macao, where he coöperated with Morrison, Medhurst, and others, in their missionary labors, he being now in communion with the Anglican church. In 1831-'3 he made extensive observations along the coasts of China, Siam, Corea, and the Loo Choo islands, first in the disguise of a Chinaman, and afterward as interpreter and surgeon on board the British ship Lord Amherst. On the death of Dr. Morrison, in 1834, Gützlaff was invited to succeed him as interpreter to the British superintendency. The difficulties that had grown up between the Chinese and British had obstructed the progress of the missions. The circulation of works in the Chinese character was forbidden, and the missionaries were compelled to remove their presses to Singapore. Afterward he was appointed secretary to the British plenipotentiary, and finally superintendent of trade, which office he held till his death. In 1844 he originated a society, ostensibly Chinese, for the purpose of carrying Christianity into the interior through the medium of native agents, and in 1849 visited Europe in behalf of the project. Besides his translation of Biblical works into various Asiatic languages, he wrote in English, "History of the Chinese Empire" (London, 1834), "China Opened" (1838), a "Journal of three Voyages along the Coast of China" (1831-'3), and a "Life of Tao-Kuang" (1851); and in Chinese, "Pro and Contra." Among his German works are *Allgemeine Länder- und Völkerkunde* (Ningpo, 1843), *Geschichte des chinesischen Reiches* (Stuttgart, 1847).

GUY, Thomas, an English philanthropist, born at Horsleydown in 1643, died in London, Dec. 17, 1724. In 1660 he was apprenticed to a bookseller in London, and after his apprentice-

ship commenced business with a capital of £200. Being very parsimonious, he rapidly accumulated a fortune. He farmed the privilege of printing Bibles from Oxford university, and during Queen Anne's wars bought government securities at a depreciated rate. He also made large sums by buying South sea stock. He had engaged to marry a favorite servant maid, but for some trifling offence he broke his engagement and repudiated her. From this period he determined to lead a life of celibacy, and to devote his property to eleemosynary purposes. The erection of the hospital at Southwark which bears his name cost £18,793, and the sum which he left for its endowment amounted to £219,499. He also built an almshouse at Tamworth in Staffordshire, for 14 poor men and women, and bequeathed to it £125 a year; while to Christ's hospital, London, he left an annuity of £400 for ever. Esteemed an avaricious and selfish man by his contemporaries, he yet dedicated more money to charitable objects than any other private individual on record in England. He also left £80,000 to be divided among those proving any degree of relationship to him.

GUYON, Jeanne Marie Bouvier de la Motte, a French mystical writer, born in Montargis, April 13, 1648, died in Blois, June 9, 1717. She was the daughter of Claude Bouvier, seigneur de La Motte Vergouville, and early displayed a religious turn of mind, which was fostered by her parents, although they would not permit her to enter a convent. In 1664 she was married to Jacques Guyon, a man of uncongenial temper and 22 years her senior; but she succeeded at length in converting him to her religious views. Five children were born of this union, two of whom died young. M. Guyon died in 1676, and in 1680 Mme. Guyon removed to Paris, where she devoted herself to the education of her children and to charitable labors. She went to Geneva for religious work, and later to Gex. Here she became intimately acquainted with a priest named Lacombe, who restored her cheerfulness at a time of religious depression, and who was appointed by the bishop to be her spiritual director, but was in fact wholly subjected to her influence. The peculiar views on sanctification and other doctrines advanced by them soon brought them under suspicion of heresy, and in 1684 both she and Lacombe were ordered by the bishop to leave his diocese. She went then successively to Turin, Grenoble, Marseilles, Nice, Genoa, Vercelli, and Grenoble again, where her instructions proved very attractive, but exposed her to persecution. During these journeys she composed her "Spiritual Torrents" and "Short and Easy Method of Prayer," and began her commentaries on the Bible. In 1686 she returned to Paris, where she spent some time in comparative retirement. She was sought out, however, by multitudes of persons, among whom were many of high rank. With the duchess de Beauvilliers, the

duchess de Béthune, and the countess de Guiche, she organized meetings of ladies of rank for prayer and religious conversation. The duke de Beauvilliers and the duke and duchess de Chevreuse were among her disciples. Shortly before this the writings of Miguel de Molinos, the originator of the party called "quietists," had been condemned at Rome as heretical, and it was soon perceived that the teachings of Mme. Guyon were but little different from his. A vigorous movement was begun for their suppression, under the leadership of Mme. Guyon's half brother La Motte, a Barnabite priest. The first step was the imprisonment in the Bastille of Lacombe, whose preaching was producing extraordinary effect, and this was soon followed by the arrest of Mme. Guyon herself by royal order, and her confinement in the convent of Ste. Marie (January, 1688); but at the end of eight months she was released through the intercession of Mme. de Maintenon. Soon after this she met Fénelon, who became deeply engaged in her instructions, while she was equally interested that he might be brought to her own views. Mme. de Maintenon was likewise fascinated with her, and permitted her to disseminate her opinions at the female seminary of St. Cyr. At the suggestion of a brother of Boileau she wrote an apology for the "Method of Prayer," which renewed the outcry against her. A royal commission, of which Bossuet and Fénelon were both members, examined her writings, and a few passages were marked out as erroneous. To this decision Mme. Guyon submitted; but Bossuet wrote a treatise against her "Method of Prayer," which embodied severe reflections upon her character and conduct. It was the refusal of Fénelon to lend his signature to this work which led to the rupture between the two illustrious prelates. (See FÉNELON.) Meanwhile Mme. Guyon was imprisoned at Vincennes, in the Bastille, and subsequently at Vaugirard. In order, it is said, to prejudice the court of Rome against Fénelon, whose "Maxims of the Saints," a treatise designed to favor Mme. Guyon's doctrines, was then under examination by the pope, a letter was obtained from Lacombe, imprisoned at Vincennes, in which he exhorted Mme. Guyon to repent of their criminal intimacy. There is no doubt that the intellect of the enthusiast had been impaired by his confinement, and in fact he died insane not long afterward. Nevertheless, Mme. Guyon was sent back to the Bastille, her son was dismissed from the army, and some of her friends were banished. Her virtue, however, was acknowledged in the assembly of the French clergy at St. Germain in 1700, and in 1702 she was released from prison and banished to Diziers, where and in the neighboring city of Blois she passed the rest of her life in perfect retirement, professing on her deathbed an unhesitating faith in the Roman Catholic church and all its dogmas. The heresies of

which she was suspected consisted mainly in her doctrine of sanctification by faith, and of that complete identification of the will with the will of God which quietists call the "fixed" or "continuous state," and which is fully described in the "Spiritual Guide" of Molinos. She charged her opponents with having interpolated passages in her works and forged several writings which bore her name. Her principal works are: *Moyen court et très-facile pour l'oraison* (Lyons, 1688-'90); *Les torrents spirituels*, first printed in an edition of her *Opusculs spirituels* (Cologne, 1704); *Les livres de l'Ancien et du Nouveau Testament, traduits en français, avec des explications et des réflexions qui regardent la vie intérieure* (20 vols. 8vo, Cologne, 1713-'15); *Discours chrétiens et spirituels* (1716); *Lettres chrétiennes, &c.* (4 vols. 8vo, 1717); collections of hymns, &c.; and her autobiography, written during her imprisonment, and published after her death (*Vie de Madame Guyon, écrite par elle-même*, 3 vols. 12mo, Cologne, 1720). This work is silent upon some of the most important incidents of her life, and it has been supposed that it was written by Poiret from her papers. Many of her hymns were translated by Cowper.—See Upham's "Life and Religious Opinions and Experience of Madame de la Motte Guyon" (2 vols. 12mo, New York, 1847).

GUYOT, Arnold Henry, an American geographer, born near Neuchâtel, Switzerland, Sept. 28, 1807. He studied at Neuchâtel, Stuttgart, and Carlsruhe, where he formed an intimate friendship with Agassiz, and began with him the study of natural science. He afterward studied theology for three years at Neuchâtel and Berlin; but he was gradually led to devote himself to physics, meteorology, chemistry, mineralogy, zoology, and botany. In 1835 he went to Paris, where he resided five years, passing the winters in study and the summers in scientific excursions through France, Belgium, Holland, and Italy. In a tour of Switzerland in 1838, he first discovered the laminated structure of the ice in glaciers, the motion of the central portion being more rapid than that of the borders, as in streams of water. He showed that the motion of the glacier is due to the displacement of its molecules. These discoveries were fully confirmed and illustrated by the investigations of Agassiz, Forbes, and others, several years afterward. He next investigated the distribution of erratic boulders, in order to solve the question of the mode of their transportation. De Saussure, Von Buch, Escher, and Charpentier had made numerous observations on this subject, but the extent and true limits of these great outpourings of rocks from the bosom of the Alps were not accurately known. During seven successive summers Guyot traced them on both sides of the central Alps, in Switzerland and Italy, over a surface 300 m. long and 200 m. wide, and delineated eleven different regions of rocks. Their vertical limits and the laws of their descent were

determined by means of more than 3,000 barometrical observations; and the characteristic species of rock of each basin were tracked step by step to their source. The full details of these investigations were announced to form the second volume of the *Système glaciaire* by Agassiz, Guyot, and Desor, the first volume of which was printed in Paris in 1848; but political disturbances and the removal of Guyot to the United States prevented its publication. A topographical map of the subaqueous basin of the lake of Neuchâtel, believed to be the first of the kind ever published, was his next work. Guyot was professor of history and physical geography in the academy of Neuchâtel from 1839 to 1848. He then removed to the United States, and resided for several years at Cambridge, Mass., occasionally delivering lectures on his favorite subjects. He delivered in Boston in the winter of 1848-'9, in the French language, a course of lectures on the relations between physical geography and history, afterward translated and collected into a volume under the title of "Earth and Man." He was now employed by the Massachusetts board of education to deliver lectures in the normal schools of the state and before the teachers' institutes, and by the Smithsonian institution to organize a system of meteorological observations, for which he prepared an extensive series of practical tables. He was the first to determine the true height of Mt. Washington, in 1851; of the Black mountains of North Carolina, in 1856; and of the Green mountains of Vermont, in 1857. By these investigations he ascertained that there are more than 20 peaks in the Black and Smoky ranges higher than Mt. Washington. In 1855 he was appointed professor of physical geography in the college of New Jersey at Princeton, which post he still retains. In 1873 the Vienna international exhibition gave him a medal of progress for his geographical works. He read a paper on "Cosmogony and the Bible" before the meeting of the evangelical alliance in New York in 1873, embodying the substance of a course of lectures previously delivered in the Union theological seminary in New York. He has also published "Directions for Meteorological Tables" (Washington, 1850); "Geographical Series, Primary Geography" (New York, 1866; almost immediately republished under the title "Introduction to Geography"); "Intermediate Geography" (1870); and "Physical Geography," with a set of wall maps (1873). He has delivered lectures on "The Unity of the System of Life, the true Foundation of the Classification of Plants and Animals," in Brooklyn, N. Y., and before the Smithsonian institution in Washington, and on "Man Primeval," in the Union theological seminary in New York.

GUYSBOROUGH, an E. county of Nova Scotia, Canada, bordering N. E. on the gut of Canso and Chedabucto bay, and S. E. on the Atlantic; area, 1,656 sq. m.; pop. in 1871, 16,555, of whom 5,348 were of Scotch, 4,000 of Irish,

3,575 of English, and 1,190 of French origin. It is intersected by the St. Mary's and other rivers, and the coast is indented by numerous inlets. The fisheries are important, and gold mining is carried on at several points. Along the coast the land is rocky and barren, but in the interior there are some excellent farming tracts. Capital, Guysborough.

GUYTON DE MORVEAU, Louis Bernard, a French chemist, born in Dijon, Jan. 4, 1737, died in Paris, Jan. 2, 1816. While yet a minor he was appointed deputy attorney general at the parliament of Dijon, which post he held till 1782. He devoted his leisure to scientific pursuits, and procured the establishment at the academy of Dijon in 1774 of public lectures upon various branches of natural philosophy, and himself undertook the professorship of chemistry. In conjunction with Maret and Durande, he published in 1777 *Éléments de chimie théorique et pratique*, and also published annotated translations of several treatises of Bergman, Scheele, and Black. As early as 1773 he had used chlorine as a general disinfecting agent, and made the results of his experience known in his *Traité des moyens de désinfecter l'air* (1801). He suggested in 1782 the plan of a new chemical nomenclature, which was at once adopted by Lavoisier and others, who, in conjunction with him, perfected the original idea and reduced it to the shape it still retains. Meanwhile Guyton wrote the *Dictionnaire de chimie* for the *Encyclopédie méthodique*. In 1791 he was elected deputy to the legislative assembly, and afterward to the convention, where he voted for the death of Louis XVI. He was among the promoters of the polytechnic school, in which he was subsequently professor and director. He was administrator of the mint from 1800 to 1814, and favored the decimal system.

GUJERAT, or *Gujerat* (Hindoo, *Gurjara Rashtra*), a large district of India, in the province of Bombay, between lat. 20° 45' and 24° 45' N., and lon. 69° and 74° 20' E., bounded N. by the gulf of Cutch and Rajpootana, E. by Candeish and Malwa, S. by several British collectorates, the gulf of Cambay, and the Arabian sea, and W. by Cutch and the sea; area, 41,536 sq. m.; pop. estimated at 3,000,000. It comprehends the peninsula of Cattywar, the dominions of the guicowar, and several petty native states. The Western Ghats form its E. boundary as far N. as lat. 21° 28', when they turn eastward. The W. extremities of the Sautpoora and Vindhya mountains extend a short distance into the province. The central regions are level and open. The principal rivers are the Sabbermuttee, Mhyee, Nerbudda, Taptee, and western Bunnass. The mineral resources are small, and confined chiefly to iron and fine carnelians. The lion, tiger, leopard, wolf, hyena, antelope, deer, nylgau, camel, and buffalo are common. The staple crop is cotton, which occupies about one half of the tilled land. Rice is much cultivated, and wheat, barley, bajra (the princi-

pal food of the poorer classes), gram, &c., are abundant. The inhabitants comprise Hindoos, Mahrattas, Rajpoots, Parsees, Coolies, Koonbies (an agricultural tribe), Dunjas (who subsist chiefly by the chase and fishing), Catties (who predominate in Cattywar), Jains, Bheels, Charuns, and Bhats. Among the principal towns are Baroda, Dongurpoor, and Cambay. —Guzerat formed part of the Mohammedan empire of Delhi, and, after having been separated from it during the Toghluks dynasty, was reannexed by Akbar in 1572, and remained a dependency till 1724. The Mahratta peishwa and the guicowar held large possessions in Guzerat, but the authority of the latter only is now recognized, the peishwa's territory having been ceded to the British.

GWALIOR, or *Gualior*. **I.** A part of India until lately nominally independent, but now subsidiary to the British, bordering on the Northwest Provinces, Bombay, &c. It stretches very irregularly between lat. 21° and 26° 40' N., and lon. 73° 40' and 77° E.; area, 33,119 sq. m.; pop. about 3,250,000. The surface of the country in the north is level, in the centre hilly, and in the south rises into the Vindhya and Satpoora mountains. The Chumbul river bounds it on the N. W.; other rivers are the Sindé, Betwah, and Dussam, flowing generally N. into the Jumna. S. of the mountains the Nerbudda and Taptee flow W. The soil is generally very fertile. The climate in the elevated S. part is mild and healthful. In January and February the thermometer falls three or four degrees below the freezing point; in the summer it sometimes rises to 100°. The most important product of the country is opium, which is delivered by treaty at a certain price to the British authorities. Burhanpoor in the south is the chief manufacturing town, where fine muslin scarfs, gold thread, glass, and paper are made. Other chief places are Gwalior, Oojein, Mundisoor, Hindia, and Chunderee. — This state was founded after the successes obtained by the Mahrattas over the Mogul forces in 1738 by Ranojee Sindia, a chief who raised himself from obscurity to eminence. His natural son Madhaji Sindia, who succeeded him, was an able and ambitious man, who greatly enlarged the possessions of the family, and in 1782, by the treaty of Salbye, concluded between the East India company and the peishwa, was recognized as a sovereign prince (maharajah). He maintained a large and well appointed army, organized and disciplined by French officers; and possessed himself of Delhi, Agra, and the person of the Mogul emperor, in whose name he subsequently acted. His dominions extended to the river Taptee on the south, and from the Ganges on the east to the gulf of Cambay on the west. His successor, Dowlat Row, became involved in war with the British, by whom his armies were totally defeated in 1803, and a considerable part of his territories taken from him, and he ceased to control the person of the Great Mogul. He

died in 1827, and was succeeded by Mugut Row, on whose death without children in 1843 the country fell into confusion and anarchy, which led to the interposition of the British; they restored order, and established the authority of the legitimate sovereign, Bhagerut Row Sindia, a boy eight years of age, who attained his majority in 1853. By a treaty concluded Jan. 13, 1844, it was stipulated that Sindia might maintain a military force not exceeding 9,000 men. Besides this, he was bound to maintain and pay about an equal number of the sepoys organized and commanded by British officers. The last body was termed the Gwalior contingent, and was mainly stationed at the fortress of Gwalior. During the sepoy mutiny in 1857 it joined in the revolt, murdered or put to flight its European officers, and demanded that Sindia should lead them against the British at Agra. The maharajah, however, remained faithful to the British, and

covered with blue porcelain tiles. Gunpowder and fireworks are made here, and there are cannon foundries. The rock, on the summit of which the fortress is built, is of sandstone, capped in some places with basalt. The face is perpendicular, and in some places the upper part overhangs the lower. The greatest length of the rock from N. E. to S. W. is $1\frac{1}{2}$ m., the greatest breadth 300 yards. The height where it is greatest at the N. end is 342 ft. On the E. face several colossal figures are sculptured in bold relief. The entrance to the fortress is toward the N. end of the E. side: first, by means of a steep road, and higher up by steps cut in the face of the rock, of such a size and inclination that elephants can ascend them. This staircase is protected on the outer side by a massive stone wall, and is swept by several cannon pointing down it. The passage to the interior is through a succession of seven gates. The fort contains a palace and two remarkable



Gwalior.

pyramidal buildings of red stone in the most ancient style of Hindoo architecture. The fortress of Gwalior was built in 773 by Surya Sena, rajah of the adjacent territory. In 1023 it was unsuccessfully besieged by Mahmud of Ghuznee. After many sieges and passing through various hands, it was taken by stratagem by Baber in 1526. Subsequently Akbar made it a state prison. After the dismemberment of the empire of Delhi it fell into the hands of the Sindia family, from whom it was taken by the English in 1780.

It was recovered by exerted himself to prevent the contingent from taking the field; but in May, 1858, the mutineers commanded by Tantia Topee and Row Sahib, nephew of Nana Sahib, having been defeated and hard pressed by Sir Hugh Rose at Calpee, suddenly marched upon Gwalior, intending to make it a place of refuge. Sindia met them with his native troops a few miles from Gwalior, and gave them battle, June 1, but was deserted, and fled to Agra. The mutineers made Row Sahib maharajah of Gwalior. Sir Hugh Rose, however, shortly after reinstated Sindia. II. A city, capital of the district, in lat. $26^{\circ} 13' N.$, lon. $78^{\circ} 15' E.$, 65 m. S. of Agra, and 175 m. S. by E. of Delhi; pop. about 30,000. It stands at the foot of a high rock crowned by the fortress, and contains the tomb of Mohammed Ghous, a famous saint of the time of the emperor Akbar, a very beautiful building of white sandstone, with a cupola

Sindia in 1784, was again taken by the British in 1803, and again restored in 1805, and from 1844 garrisoned by the Gwalior contingent under British officers.

GWILT, Joseph, an English architect, born in Southwark, Jan. 11, 1784, died at Henley, Sept. 14, 1863. His principal architectural works are Markham castle near Sligo, and Charlton church, near Woolwich. He published *Notitia Architectonica Italiana* (1818), a translation of Vitruvius (1826), and an "Encyclopædia of Architecture" (1842), and edited Nicholson's "Principles of Architecture" (1848).

GWINNETT, a N. county of Georgia, bounded N. W. by the Chattahoochee river, and drained by head streams of the Appalachee, Yellow, and Ulecofauhachee; area, 550 sq. m.; pop. in 1870, 12,431, of whom 2,159 were colored. It is traversed by the Atlanta and Richmond Air-Line railroad. It is rich in minerals, in-

cluding gold, which is found on the Chatahoochee, iron, antimony, and superior granite. The surface is hilly and the soil of the river bottoms fertile. The chief productions in 1870 were 55,102 bushels of wheat, 206,210 of Indian corn, 31,707 of oats, 16,964 of sweet potatoes, 65,787 lbs. of butter, and 1,391 bales of cotton. There were 1,058 horses, 1,855 milch cows, 2,789 other cattle, 6,115 sheep, and 8,496 swine. Capital, Lawrenceville.

GWINNETT, Button, one of the signers of the Declaration of Independence, born in England about 1732, died in Georgia, May 27, 1777. He emigrated from Bristol to America in 1770, engaged for two years in trade in Charleston, and then purchased a tract of land on St. Catharine's island, Georgia, and devoted himself to agriculture. He became conspicuous in 1775 as an advocate of colonial rights, was elected a representative to congress in February, 1776, and in 1777 became president of the provincial council of Georgia. He planned a military expedition against East Florida, which he refused to intrust to his rival Gen. McIntosh, whose official rank entitled him to command it, and which resulted disastrously. This event led to a duel between him and Gen. McIntosh, in which he was mortally wounded.

GWYNN, or **Gwinn, Eleanor**, one of the mistresses of Charles II., born in London about 1650, died there about 1690. It is said that her father, Capt. Thomas Gwynn of the army, was a member of an ancient Welsh family; but that she was born in a night cellar in the Coal Yard, Drury Lane, and was reared in the lowest haunts of vice. She was an orange vender, and wandered from tavern to tavern, entertaining the company with her songs. After being the mistress successively of the actors Hart and Lacy, she went in her 16th year upon the stage, and became one of the most popular actresses of the time in light, humorous parts, especially where singing and dancing were introduced. About 1667 she became the mistress of Lord Buckhurst, who, it is said, for a political reward, surrendered her to his royal master. She remained on the stage till 1671, although her intimacy with Charles, which lasted till his death, commenced in 1669. Upon becoming his acknowledged mistress she was called Madam Ellen, had an establishment of her own, and was even made a lady of the privy chamber to Queen Catharine, and admitted to the best society of the period. The king at first refused her demand of £500 a year, although she is said subsequently to have cost him upward of £60,000 in four years. Of all his mistresses Nell was the only one who remained faithful to him, and the only one perhaps who has won any sympathy or forgiveness from posterity. Her frailty and a tendency to hard swearing seem to have been her chief faults. She was merry and open-hearted, generous to profusion, and in her prosperity ever mindful of her old friends, particularly those of the theatrical profession.

Dryden, Lee, Otway, and Butler are reported to have been liberally aided by her. She instigated Charles to erect Chelsea hospital for disabled soldiers, presenting the land on which the building stands, and her health used regularly to be drunk by the pensioners on the anniversary of Charles's birthday. She was even popular with the public, as the supposed representative at court of Protestant interests. Charles appreciated her good qualities, and among his last words were, "Let not poor Nelly starve." She bore him two sons, one of whom died in childhood, and the other was successively created a baron, an earl, and finally duke of St. Albans. She is believed to have led a virtuous life after the death of the king, and her funeral sermon was preached by Dr. Tenison, afterward archbishop of Canterbury. The "Memoirs of the Life of Nell Gwynn, Mistress to K. Charles II., by John Seymour, Comedian" (1752), is a panegyric. Another memoir, by Peter Cunningham, was published in 1850.

GYGES, the first Lydian king of the dynasty of the Mermnadæ. He was originally a chief officer at the court of his predecessor Candaules. According to Herodotus, Candaules was proud of the beauty of his queen, and insisted that Gyges should conceal himself in her chamber in order to see her naked. Gyges reluctantly obeyed, and was seen by the queen as he glided from her apartment. She was indignant at this insult, and sending for Gyges gave him the choice of being immediately put to death or of killing her husband. Gyges chose the latter alternative, and after slaying his sovereign he shared the Lydian throne with his former mistress. His reign commenced about 716 B. C., and lasted 38 years. The wealth of Gyges, like that of his successor Cræsus, was proverbial. He sent magnificent presents to Delphi, and carried on wars with Miletus, Smyrna, Colophon, Magnesia, and other cities of Asia Minor.—According to a story recorded by Plato, Gyges was the shepherd of Candaules, and found in an earthquake gap a great brazen horse containing a corpse with a golden ring, by means of which he could render himself invisible at will. With this power he destroyed Candaules and usurped his throne.

GYMNASIUM (Gr. γυμνός, naked), a term applied anciently in Greece and Italy, and now in continental Europe, and especially in Germany, to schools of a higher class, but in England and America to places for physical exercise. The Greek gymnasium was so called because of the preëminence given in Greece to physical culture. The education of a Greek youth was divided into three parts, grammar, music, and gymnastics; to which Aristotle added a fourth, drawing or painting. Gymnastics, however, occupied as much time as all the others together, and were continued after the mental education was finished. There was no Greek town of importance without its gymnasium, and Athens had three: the academy, famous for the instructions of Plato;

the lyceum, where Aristotle taught; and the cynosarges. A gymnasium is described by Vitruvius, which is believed to have been at Naples, and which illustrates the general construction of gymnasia in Greece and Italy. It consisted of four porticos placed in a square 1,200 ft. in circumference; three of them arranged with seats for philosophical and rhetorical conversation, while the fourth, a double portico, contained a large hall in the centre and rooms for the bath, anointing, and other purposes. In the winter gymnastic exercises were carried on in the shelter of the portico, and there were also sheltered and covered walks for study. The laws of Solon regulated the use of the gymnasium with great strictness, and a gymnasiarch or governor of the gymnasium was appointed with power to remove any teacher, philosopher, or sophist whom he thought injurious to the youth. The teacher of gymnastics was expected to know the physiological effect of the different exercises, and to assign to each pupil such as were suitable for him. The gymnasia were dedicated to Apollo, the god of physicians, because of their relation to health and disease.—In Germany the gymnasia occupy a middle place between elementary schools and the universities. The classics, mathematics, physics, and German literature are taught in them.

GYMNASTICS (Gr. *γυμναστική*, gymnastic art), a system of exercises which develop and invigorate the body, particularly the muscular system. If properly directed, gymnastics will enlarge and strengthen the various muscles of the trunk, neck, arms, and legs, will expand the chest so as to facilitate the play of the lungs, will render the joints supple, and will impart to the person grace, ease, and steadiness of carriage, combined with strength, elasticity, and quickness of movement; but an injudicious mode of exercise will frequently confirm and aggravate those physical imperfections for which a remedy is sought, by developing the muscular system unequally. Though athletic feats were at first performed by each individual according to his own notions, and were encouraged among the youth as combining amusement with exercise, they were at length reduced to a system, which in Greece formed a prominent feature in the state regulations for education; and as the nature of the warlike weapons rendered the development of physical force a subject of the highest military importance, athletic sports were continued during manhood. Public games were also consecrated to the gods, and were conducted with the greatest ceremony. The earliest mention we can find of gymnastic sports is in Homer's *Iliad*, book ii., where the Greeks are described as contending at javelin throwing and quoits; and again in book xxiii., when Achilles instituted games in honor of Patroclus, and distributed prizes to the victors for boxing, wrestling, throwing the quoit, chariot racing, &c. Plato tells us that just before

the time of Hippocrates gymnastics were made a part of medical study, as being suitable to counteract the effects of indolence and luxurious feeding, and that at length they became a state matter, reduced to a system and superintended by state officers. The first public gymnasia were built by the Lacedæmonians. These were imitated at Athens; where, in the walks belonging to one of them called the *Academia*, Plato instructed his pupils, and in another, named the *Lyceum*, Aristotle taught. At Athens a chief officer (*γυμνασιάρχης*) superintended the whole establishment; the *ἐνστέρας* superintended only the most athletic exercises; medical officers were in attendance, whose duty it was to prescribe the kind and extent of the exercise; the *παιδοτρέβης* assisted and instructed the pupils, who commenced with easy exercises, from which they were gradually advanced to the more violent, till they reached the highest degree of agility and strength. Baths were attached to the gymnasium; the system most recommended was to take first a hot bath, and then to plunge immediately into cold water. Plato and Aristotle considered that no republic could be deemed perfect in which gymnasia, as part of the national establishments, were neglected. The Spartans were the most rigid in exacting for the youth a gymnastic training; even the girls were expected to be good gymnasts, and no young woman could be married till she had publicly exhibited her proficiency in various exercises. Honorable rewards and civic distinctions were publicly bestowed on the victors in the games; the rewards were styled *ἀθλα*, wherefore those who contended for them were termed *ἀθληταί*, or athletes. The exercises for the pupils in the gymnasia consisted of a sort of tumbling, and war dances; running, much recommended for both sexes; leaping, and sometimes springing from the knees having weights attached to the body; retaining the equilibrium while jumping on slippery skins full of wine, the feet being naked; wrestling for the throw, or to keep the other undermost after the throw; boxing, confined nearly exclusively to the military and athletes. The boxer either held the hands open, or he clenched brazen or stone spheres, or wore the *caustus* or leathern band studded with metal knobs bound round his hands and wrists; there was also a mixed practice of boxing and wrestling called *παγκράτιον*. The pitching of the quoit was much practised; a variation of the quoit was found in the *ἀλτήρες*, not unlike a dumb-bell, which was thrown by one to another, who caught it and then pitched it to a third, and so on; it was also adopted in extension motions, and was held in the hand with the arm extended. Javelin throwing was practised by both sexes; also throwing the bar. Riding, driving, swimming, rowing, swinging, climbing ropes, standing erect for a long time in one position, holding the breath, shouting, shooting the arrow, &c., were also taught.—

Modern gymnastics differ considerably from the exercises of the ancients. During the middle ages the knightly amusement of the tournament absorbed nearly every other sport, except the use of the quarterstaff, archery, foot racing, and wrestling, which were practised in a few places; so that gymnastics fell nearly into disuse till Basedow, in 1776, at his institution in Dessau, united bodily exercises with other instruction, which example was subsequently followed by Salzmann at his institute, and from this small commencement the practice gradually extended. In the latter part of the 18th century gymnastics were extensively introduced into Prussian schools by Guts-Muths, who wrote several works on the subject; and about 1810 the system was still more widely spread by Jahn, who may be regarded as the founder of the present *Turnvereine*. Prussia being at that time impatient under Napoleonic rule, Jahn conceived the project of bringing together the young men for the practice of gymnastic exercises, and at the same time of indoctrinating them with patriotic sentiments which might be made available to expel the French from Germany. The Prussian government favored the plan, and in the spring of 1811 a public gymnastic school or *Turnplatz* was opened at Berlin, which was quickly imitated all over the country. On Feb. 3, 1813, the king of Prussia called the citizens to arms against the French, when all those old enough to enter the military service joined the national cause, and performed signal service. Jahn himself commanded a battalion of Lützow's volunteers, and after the peace returned to his gymnastic schools. When, however, there was no longer any reason to dread French invasion, the government of Prussia, regarding the meeting of patriotic young men as a means of spreading liberal ideas, closed the gymnastic schools, and Jahn was imprisoned. In some other countries, however, the system introduced by Jahn was eminently successful, especially in England, Switzerland, Portugal, and Denmark. It was first introduced into female education under the name of callisthenics, when systematic exercises were added to hoop trundling, skipping ropes, dumb-bells, &c., already usual among the girls, and to riding, archery, and other healthy outdoor exercises among the women. The masculine sports of cricket, football, quoits, boxing, wrestling, base ball, leap-frog, foot racing, &c., have been for centuries enjoyed by the boys of England, in the play grounds attached to the schools. In 1848 the political condition of Europe enabled the turnvereins to be reorganized, and the German emigration to the United States has brought these institutions with it. The first society was formed in New York, but similar associations soon spread all over the United States. The organization, as first established, was confined to the practice of bodily exercises conducive to physical development; but it soon assumed a higher scope, without neglecting its original object;

libraries were collected, schools were established, a newspaper (*Turnzeitung*) was founded, and various arrangements were made for the diffusion of useful knowledge and for mental culture. Thus the turnvereins of the United States tread closely in the track of the academy of Athens; and when we consider the intimate connection between mind and body—how the suffering and the well-being of the one are affected by the condition of the other—too much attention can scarcely be paid to the combination of physical with mental improvement. The several local organizations of the turnverein hold annually a general meeting, by means of delegates, for the consideration of matters of common interest; they also have an annual festival, attended by representatives of the several organizations, wherein are exhibited feats of strength and agility, swimming, military manoeuvres, rifle shooting, sword exercise, &c. There are, moreover, several local festivals every year in the respective districts. —There are many forms of exercise which require no special skill or practice, and which consequently may be employed with advantage by all. Excluding various games, such as base ball, cricket, and racket, and certain special exercises, as rowing, boxing, and fencing, the most available ordinary exercises are walking and horseback riding. Unless one walks at a rapid rate, little benefit is to be derived from this as an exercise. Two or three miles of walking, at the rate of four miles or more an hour, are more beneficial than a much longer walk when the movements are slow and indolent. In the former instance, the method of walking is necessarily more natural and more in accordance with the rules laid down by athletes, and the respiratory function is brought into more vigorous action. Horseback exercise, particularly the trot, is also beneficial, gives a free use of the arms and legs, strengthens the back and loins, and is generally exhilarating. Outdoor sports, such as leaping, the long and high jump, leaping with the pole, "putting the stone," throwing the hammer, running, fast and long walking, &c., are much cultivated in England and Scotland. The Caledonian games are exhilarating, produce fine and uniform muscular development, and experts in these exercises are almost always models of health and vigor. There are also many valuable methods of exercise that may be profitably employed at home, without necessarily having recourse to a regularly organized gymnasium. The best of these are the following. Swinging Indian clubs is an exercise in which there are many different movements, most of which are described in books on gymnastics. This exercise is a good one for the joints, especially the wrists, but does not produce great muscular development, or much improvement of the "wind." Exercise with light dumb-bells, five pounds or even less, making a great variety of movements, will develop and harden the muscles of the arms and shoulders,

sometimes to an extraordinary degree, particularly when combined with more severe gymnastics. This exercise may be continued with advantage almost uninterruptedly for an hour, or even longer. A great variety of movements may be performed with an arrangement of elastic bands with handles, made to imitate the pulley weights of a gymnasium. Most of the other exercises of the arms, legs, and body, called the free exercises, come under the head of callisthenics. Some of the more simple forms of gymnastic apparatus may with advantage be erected in the open air, and constitute a useful recreation for school boys. Exercises on the single or horizontal bar, and the high jump, standing or running, come under this head. A well organized gymnasium is provided with a great variety of apparatus, by which nearly every muscle in the body may be brought into play. In a complete gymnasium, an instructor is necessary at first, particularly for the young, who might otherwise, by carelessness or ignorance, produce injuries which would defeat the objects of the exercise. For the adult, exercise within proper limits in a gymnasium, particularly when taken in classes, not only develops the whole system and regulates the most important functions of the organism, but the feeling of emulation excites interest, and the exercise is valuable as a relief from mental strain. This is particularly useful for those of sedentary pursuits. The most simple gymnastic exercises are the following: the upright bars, or chest bars, which render the shoulder joints supple and expand the chest; the leg weights, pushing weights with the feet while in a sitting posture; the pulley weights, which strengthen the arms and shoulders; the rowing weights, an apparatus intended to imitate the movements in rowing; light dumb-bells, and club swinging. The more severe exercises are: the horizontal bar, upon which a great variety of feats of strength and dexterity may be performed, many of which require address that can only be acquired by long practice; horizontal and inclined ladders, which are climbed with the hands; climbing the rope; climbing the peg pole, an exercise requiring great strength in the arms, in which those with light bodies are usually most proficient; drawing the body up with one or both hands; holding the body, suspended by the hands, horizontally, with the face up or down, called the front and back horizontals, requiring great strength in nearly all the muscles; one-arm horizontals, requiring even greater strength; and holding the body extended horizontally from a perpendicular bar, the "flag," requiring considerable strength and practice. The various free exercises known as tumbling, human pyramids, &c., demand much strength, practice, agility, and confidence. The most common of these are front hand springs, "flip-flaps" or back hand springs, turning, twisting, &c., on the ground, springing from a lying posture on the ground to the erect position,

back and front somersaults from feet to feet, battoute leaping from an inclined plane, and many other feats, even more difficult, that are performed chiefly by professional gymnasts. Vaulting is a very useful and a simple exercise, which gives agility and develops strength in the arms as well as in the legs. Balancing the body upon the hands, walking on the hands, &c., give command of equilibrium. The Japanese gymnasts particularly excel in these feats. A good "hand balance" is considered very difficult to acquire, and its practice is usually begun at an early age by professional gymnasts. Some of the most useful exercises for an expert gymnast are performed in great variety upon the parallel bars. The parallel bars constitute perhaps the most useful apparatus in the gymnasium for developing the muscles of the shoulders, the chest, and the back. The single and the double trapeze are now much in vogue with gymnastic experts. The flying trapeze is not much used by amateurs, as this exercise is by no means devoid of danger, and almost all professionals acquire their skill in this at the expense of many severe falls. A great variety of difficult feats may be performed with the swinging rings. These are not so dangerous as the feats on the flying trapeze; they develop strength in the muscles of the arms, shoulders, and body, and the grip, and are entertaining and agreeable exercises. Among what are called the heavy exercises are prominent the "putting up" of heavy dumb-bells, with one or both hands, and the lifting of heavy weights with the hands or in a harness. Putting up two 100-pound dumb-bells, one in either hand, is justly considered a great feat of strength; it requires enormous power in the arms and shoulders, and particularly in the back. Putting up a single dumb-bell of 100 lbs. or more requires great strength and practice. In putting up heavy dumb-bells with one hand, the weight is carried to the shoulder with both hands, and is then raised from the shoulder with one hand until the arm and the body are straight. A single dumb-bell weighing 200 lbs. has been put up in this way with one hand, which is a Herculean feat. In exercises of this kind, the muscles should be trained gradually and carefully, otherwise severe strains are likely to occur; but heavy dumb-bells develop the muscles of the back, loins, thighs, and legs, as well as those of the arms and shoulders. Holding out weights horizontally at arm's length is a favorite heavy exercise, particularly with those who have very short and muscular arms. Lifting heavy weights with the hands, or with a harness of straps and a yoke over the shoulders, is an exercise now very much in use. In lifting with the hands alone, the lifter stands upon a platform beneath which the weight is suspended; connected with the weight are two handles of convenient shape, at a proper height; the handles are grasped, the legs are slightly bent, the back is hollowed, the arms

are straight, the shoulders are in a line with the feet, and when the lift is made the whole body is straightened. With a heavy weight, an instantaneous lift even of an inch is sufficient. The first effort is usually aided by a strong spring, which is compressed by the weight; but the lift must be made to clear the spring completely. Between 1,300 and 1,400 lbs. have been thus lifted. A heavy lift of this kind brings nearly every muscle of the body into action, but it strains particularly the grip, the muscles of the neck and the top of the shoulders, the thighs, and the small of the back. Heavy lifts are liable to produce severe strains, unless the lifting position be perfect. Lifters should proceed gradually from light to heavy weights, and should not attempt heavy lifts except under competent instruction. The so-called lift cures are undoubtedly useful, as they condense a great amount of muscular exercise into a very short time. Lifting is sometimes done with a bar between the legs, grasped with both hands; but this position is not so favorable as that with handles by the sides. In lifting with harness, the great strain is taken from the hands and transferred to the shoulders; 3,000 lbs. have been lifted in this way. Expert lifters usually lift every day a weight that they can raise with comparative ease, and make a maximum lift only once in two or three weeks. Besides the above, which comprise most of the exercises of the modern gymnasium, a number of others are sometimes practised, as evolutions on the wooden horse, exercises with wands, &c.—Callisthenics (Gr. *κάλλος*, beauty, and *σθένος*, strength) constitute a system of exercises requiring less violence of muscular action than the ordinary gymnastics. This system is considered to be better adapted to the more delicate organization of females, and is generally confined in its application to that sex. Its purpose is to give equal development to all the muscles, and thus produce that harmony of action on which depends not only health, but regularity of proportion and grace of movement. Callisthenics may be practised mediately or immediately, with or without apparatus. All the apparatus required, when used, is a strong chair, a short roller fixed in sockets near the top of an open doorway, a light wooden staff, about 4½ ft. in length and half an inch in diameter, a pair of light dumb-bells, a hair mattress, a pair of square weights, and two parallel bars. The exercises with these are simple, and can be readily learned in a lesson or two from a teacher, or from any of the numerous manuals published on the subject. In the chair exercise, the pupil plants the feet at a certain distance from the chair, and then leans forward on tiptoe, and rests the hands upon the back of the chair. The exercise consists in moving the body slowly backward and forward between the two fixed points of the toes on the floor and the hands on the back of the chair. This simple manoeuvre is admirably adapted for the expansion of the chest and the develop-

ment of all the muscles of the body. In the roller exercise, the pupil is suspended by the hands a few inches above the floor, and swings in this position, or moves the grasp alternately from side to side. A great number of graceful and strengthening movements may be made with the staff. One of the best is to hold it in both hands, and pass it successively over the head to the right and left, bringing it down each time below the middle of the person, in front or behind. The dumb-bells, being grasped by the hands, are to be moved forward and backward horizontally from the chest, or, with the arms below the hips, to be moved circularly about the body, until they meet before and behind. The exercise on the mattress consists merely in raising the person from a horizontal to a sitting posture, with the arms and legs extended and not used to aid in the movement. The square weights may be used in most cases like the dumb-bells. They have, however, the peculiar advantage of a form which allows of their being placed upon the head. This is one of the best possible means of giving uprightness to the figure, as in thus balancing a weight the spine is necessarily brought by the muscles of the back into a straight position. The negro women of the south, who are in the habit of carrying heavy burdens on their head, are remarkable for erectness of the body. The parallel bars are two poles fastened by their ends to the floor and the ceiling, at a proper distance apart, and of a thickness to be readily grasped by the hands of the pupil, which being done, the body is moved backward and forward between them. Every necessary exercise, however, can be practised without the use of apparatus of any kind, and the system of callisthenics founded on this basis is probably best for general adoption, as it is less liable to abuse from the intemperate zeal of the pupil, and more calculated to preserve the beautiful, which few women will be persuaded to exchange for any acquisition of strength. When apparatus is used, the effort is more violent, and the muscles may become so prominently developed as to cause the absorption of the soft cellular tissue which cushions the human frame, and which, by its abundance in the female, gives roundness and fulness to the form. The constant handling of the hard material of the apparatus, also, is apt to produce a disproportionate enlargement of the hand and harden its texture. The callisthenic exercises without apparatus consist in regular and systematic movements of the entire body. The head and the trunk are moved up and down, forward and backward, to the right and left; the arms and legs, and hands and feet, are also exercised so that every voluntary muscle is brought into action. The object being to give an equal muscular development to the whole frame, the exercises are so arranged that all parts of the body are successively brought into action. None of the movements are complicated, and

they are in fact no more than those usual in the ordinary exercise of the limbs. Callisthenics, however, by reducing these to a system, insures an equal and regular action of the muscles, while the occupations or amusements of females are apt to effect the reverse. It is essential that all these exercises should be practised, if indoors, in well ventilated halls or apartments. The practical utility of all gymnastics is frequently diminished by monotony, the pupil becoming wearied with the uniformity of the movements. Without the discipline of a teacher, it is difficult to secure a long persistence in their use. It is well therefore to vary them, or to associate with them as much as possible the idea of amusement. In fact, there is no better callisthenic apparatus than many of the ordinary playthings, such as the battledore and shuttlecock, the cup and ball, and the "graces." In modern callisthenics, regulating the movements to the time of music is much employed, and is useful, as it relieves their monotony. Ling, the Swedish writer on gymnastics and callisthenics, has written enthusiastically upon the advantage of systematic muscular exercise in the cure of disease. Numerous ailments to which females are peculiarly liable are due to the neglect of proper physical training, and may doubtless be relieved in many instances by the proper application of callisthenics. Most of these female disorders may be justly attributed to the weakness of the abdominal muscles, and a proper strengthening of these by exercise would no doubt remove the cause. It is evident that callisthenics, so called, are almost identical with the lighter forms of regular gymnastic exercise, and are adapted to the male as well as to the female. Exhibitions of large classes, the movements being simultaneous and performed to the time of appropriate music, are often quite graceful and entertaining.—Systematic gymnastic or callisthenic exercises are rarely if ever useful before the age of 12 or 14 years. Professional gymnasts, many of whom begin their training at a very early age, are seldom well formed men, frequently presenting extraordinary development of certain muscles at the expense of others, which amounts almost to deformity. Before the age of 12 the games and pastimes of childhood generally afford sufficient exercise; at that age, however, the lighter gymnastics or callisthenics, under competent instruction, may be the first step in the full development of a muscular system, which moderate exercise will preserve in a robust condition throughout adult life. After the age of 35 even practised gymnasts should be careful in making extraordinary muscular efforts. At that time the ligaments are comparatively stiff, and strains of the joints are apt to become troublesome and persistent. By persons of sedentary habits, gymnastic exercise is to be employed to secure health, and it is not desirable to carry training to the extent of reducing the adipose tissue to the minimum. A

fair development of fat is normal in the adult, and the system is apt to become exhausted if kept too long at a high standard of muscular development. Persons who have an unusual tendency to fat should combine with other exercise running, jumping on the spring-board, and movements which shake the body. These favor the absorption of unnecessary adipose tissue, especially in the covering of the abdominal organs, allow the diaphragm to play more freely, and give respiratory power or "wind." It is a good plan for the adult to use moderate exercise, which develops the muscular system generally, and to make one vigorous effort each day, such as lifting a heavy weight or raising a large dumb-bell. This gives nervous power, and enables one to easily put forth nearly all his strength in a single powerful effort, when this is required. It is not necessary for an adult, exercising simply for health, to cultivate excessive hardness of muscle; and indeed the greatest strength is often found in muscles that are comparatively soft. One hour's honest exercise, followed by ablation, will usually suffice for the brain-worker; and this should produce prompt reaction, without a sense of exhaustion. Persons who take this amount of judicious exercise are often more powerful and have more endurance than the hard-worked laborer. There is no doubt that judicious and habitual exercise favors the elimination of effete matters from the organism, particularly by the lungs, skin, and kidneys, increases the activity of the nutrition of the muscular system, rendering the food more relishing, more easily digested, and better assimilated, and develops what is known as nerve power. When it is remembered that the muscles constitute the great bulk of the organism, it is evident that perfect health can only exist when they are properly developed. Active nutrition of the muscles, also, is unfavorable to the deposition of morbid matters, such as are found in tuberculous, cancerous, or scrofulous constitutions; and when exercise is combined with amusement and mental relaxation, the system is in the best condition to derive its full benefit.—Ancient gymnastics are treated of in a few works: Plato, "Politics," book iii., and "Laws," book viii.; Galen, "On Preserving Health;" and Hieronymus Mercurialis, *De Arte Gymnastica*, book vi. (Venice, 1587). On modern gymnastics there are numerous treatises. Many German physicians have labored to raise gymnastics to the importance of a science, especially Dr. Schreber of Leipsic; see his *Kinesiatrik* (Leipsic, 1852) and *Aerztliche Zimmergymnastik* (5th ed., 1858). The more recent works published in the United States and England are the following: Arthur and Charles Nahl, "Instructions in Gymnastics" (San Francisco, 1863); Watson, "Callisthenics and Gymnastics" (New York and Philadelphia, 1864); William Wood, "Manual of Physical Exercises" (New York, 1867);

Ravenstein and Hulley, "Gymnastics and Athletics" (London, 1867).

GYMNOSOPHISTS (Gr. γυμνός, naked, and σοφιστής, a philosopher), a sect of ancient Indian philosophers, so called by the Greeks because they went naked, or almost naked. They were also called βραχμάναι, Brahmans. They dwelt in the woods, and lived on the wild products of the earth. They were remarkable for their contempt of death, and practised suicide by burning. In this way Calanus sacrificed himself at Babylon, in the presence of Alexander the Great, and Xarimarus at Athens, in that of Augustus. The gymnosophists had a great reputation for wisdom and learning. Their most prominent tenet was the doctrine of the immortality and transmigration of the soul.

GYMNOTUS. See ELECTRIC FISHES.

GÖNGYÖS, a town of Hungary, in the county of Heves, 44 m. N. E. of Pesth; pop. in 1869, 15,830. It is situated at the foot of the Mátra range, contains a fine castle in which is an interesting collection of armor, four Catholic churches, a Franciscan monastery, town house, and gymnasium. It has extensive manufactories of woollen stuffs, several tanneries and mills, an active trade in cattle and cheese, a weekly market, and numerous well frequented fairs. Near it are silver and copper mines.

GYPSIES, Gipsies, or Gipseys (a corruption of the word Egyptians), a vagabond people now found in most parts of the world. The names given to them by other nations are: Zingari in Italy, Gitanos in Spain, Zigeuner in Germany, Czigányok in Hungary, Tzigani in Slavic countries, Tchinganeh in Turkey, Bohémiens in France (as they pretended to come from Bohemia), &c. They are also nicknamed Mattois, Gueux, Cagoux, and their language Blesquin in France; Zich-Gauner (wandering rogues) in Germany, heathens in Holland, Tartars in Sweden, &c. They call themselves Kale or Mellele (the black), Mellelitchel (black people), Sinde or Sinte (probably from the Sanskrit *Saindhavas*, people of the Indies), but more commonly by some word signifying "people" in the various gypsy dialects, as Manush, Rom, feminine Romni. As they are ignorant of their origin, and as history has failed to record their migrations, there are very many opinions on the subject. Hasse and Schirak attempted to connect them with the *Syrinau* of Herodotus, north of the lower Ister (Danube), reported to be of Median origin. Büttner, Rüdiger, Baumeister, Pallas, and Grellmann consider them to have come from India, whence they were driven by the ravages of Tamerlane (1398), and where they belonged to the Soodra caste, or to the Pariahs. Hiob Ludolf (*Commentarius ad Historiam Ethiopicam*, 1691) gave a list of words supposed to be Egyptian, but which are rather Slavic. There are many roving tribes in India and Persia which resemble the gypsies. In northern Persia they are known as Karatchi, and in

Kermanshah and Kurdistan as Kauli and Susmani. The Zingarro or Chungur of the Punjab are also a wandering race. Vigne holds that modern gypsies are descendants of Cashmere Hindoos who fled from persecution toward the end of the 14th century. Arab Shah, who lived at Samarcand in 1422, says in his "Life of Timour" that the gypsies were probably descendants of Buddhists who emigrated about 300 B. C., when persecuted by Nara. In a paraphrase of the book of Genesis, written by an Austrian monk in 1122, similar vagrants were noticed as being Ishmaelites; but organized bands of gypsies first appeared in the Danubian provinces in 1417. They numbered about 14,000 in Italy as early as 1422. On Aug. 17, 1427, arrived at Paris a band of 120 strangers, claiming to be Christians of Lower Egypt who had been expelled



Bohemian Gypsies.

by the Saracens. They said they had last come from Bohemia. They professed the gifts of fortune-telling and palmistry, and were great thieves. They were expelled from Paris, but continued to wander in France, and other bands succeeded them. They appeared in Spain in 1447, in England about 1506, and in Sweden in 1514. Wherever they came they practised the arts of thieving and deception. Severe laws were passed against them, but these measures, not being simultaneous in the various states, failed of their effect. Spain exiled them in 1492, and about a century later renewed the decree of banishment. In England, Henry VIII. issued in 1530 a proclamation, subsequently renewed by Elizabeth, which made their stay in England for over a month a capital felony. The Scottish kings pursued a different policy, and seem to have

given them a sort of protection. Italy, Denmark, Sweden, the Netherlands, and Germany took measures against them. In the first half of the 16th century they probably received an accession of numbers from Egypt, for in 1517 a revolt against the conquest of Sultan Selim took place under one Zinganeus, whose followers, being banished, took to wandering throughout the world in small companies. The sovereigns of Germany made efforts to reclaim and settle the gypsies. Maria Theresa in 1768 ordered that the numerous bands throughout her dominions should be gathered in settled habitations, practise some trade, have their children educated, and be called *Neubauern*, new peasants. As they failed to obey, severer measures were enforced by Joseph II. in 1782, and at present the gypsies of Hungary, Transylvania, and Roumania, together about 250,000, lead a more settled life than their brethren anywhere else. In Transylvania they are under the rule of a waywode of their own race, elected by themselves. They are likewise numerous in the southern provinces of Russia and in Turkey generally. Spain contains about 40,000, some of whom follow a mixed occupation, as keepers of wine shops and horse dealers. A considerable number are in Norway; in France there are few or none; and in England their numbers have decreased to about 10,000. Estimates of the total number of gypsies in Europe are variously given from 500,000 to 700,000. The laws against them have in most countries fallen into desuetude, they having to contend with a stronger force than legal prohibitions in the increase of intelligence among the rural population, who were formerly their patrons and victims. In England the oppressive statutes against them were repealed in 1783, 1820, and 1856.—The gypsy physiognomy is Asiatic in type, with tawny complexion, quick black eyes, black hair, high cheek bones, slightly projecting lower jaw, narrow mouth with fine white teeth, which, with their lithe and agile figure, causes some of their young women to be considered beauties. Their habits are, however, so squalid and depraved as to cause them before they are past middle age to fall into decrepitude. The gypsies have few redeeming characteristics. They are treacherous, cowardly, revengeful, and cruel. They have little or no religious belief, and no words in their language to signify God, the soul, or immortality. Velasquez says, "The gypsies' church was built of lard, and the dogs ate it." Marriage is a temporary form with them, and the limits of consanguinity are not respected. They pretend that their skill in palmistry is the lore of the Egyptians. Their industry reaches no higher than the tinkering of hardware and turning small articles in wood, with occasionally some assistance reluctantly given in farm labor. In Transylvania they do a little in washing gold. They frequently act as musicians, as they have a remarkable quickness in acquiring tunes by

ear. Some of them, as Kecskeméti, Kálozdy, and Bunkó, have been celebrated violinists. The young persons of both sexes are fond of dancing, and exhibit their skill for money, especially in Spain. The men wear no distinguishing dress from other similar vagabonds, but the women indulge their passion for gay colors and trinkets. In England the recognized gypsy woman's apparel is a red cloak with a hood, and a handkerchief tied over the head. Their huts are mere kennels of earth and boughs. It has been a question whether a band of genuine gypsies has ever been in America; but many English authorities maintain that the decrease of their number in the British isles is in a great measure due to their having emigrated to the United States.—The language of the gypsies, though everywhere preserving forms of an unmistakably Indian origin, differs greatly in the various countries in which it is spoken. The best known are the English, German, Hungarian, and Spanish gypsy dialects. We shall confine ourselves to the English dialect, and follow the statements made in regard to it by Bath C. Smart before the English philological society in London. The English gypsies generally use the English article, and but seldom their own forms, *o* for the masculine and *y* for the feminine. Nouns generally terminate in a consonant, or else in *o* when masculine, and in *i* or *y* when feminine. The genitive is formed by adding *esko* or *esto*; the plural by *yor* or *or*, and sometimes with an additional *s*, taken from English; as *skammin*, a chair, *skamminyors*, chairs. Adjectives have invariably a final *o* or *y*, added even to English words. The comparative is formed by adding *dair* or *dairo* when there are no special forms, like *coosko*, good, *fetterdairo*, better. There seems to be no superlative termination. The pronouns are in many cases preserved in their original form, as *yor*, he; *lesty*, his; *yoi*, she; *latty*, her. Instead of "I," they use "me," but for "of me" they return to their own *mandy*. The numerals are: *yek*, one; *dooy*, two; *tring*, three; *stor*, four; *panch*, five; *shov*, six; *afta*, seven; *oitoo*, eight; *enneah*, nine; and *desh*, ten. *Afta*, *oitoo*, and *enneah* are, however, of rare occurrence. Verbs are generally inflected as in English, but *av* is sometimes added as a sign of the first, and *ella* or *l* of the third person singular. Prepositions are: *agal*, before; *adrey*, within; *aprey*, upon; *taley*, down; *pawdel*, over. The ease with which the gypsies introduce foreign words into their own speech will be seen from the following proverbs given by Charles G. Leland in his book "The English Gypsies and their Language" (London, 1873):

A cloudy sala often purabens to a fino divere.
A cloudy morning often changes to a fine day.

It's sim to a choomer, kushti for kek till it's
It's like a kiss, good for nothing until it is

pordered atween dut.
divided between two.

—Works on the gypsies and their dialects are: Valente's "Description of the East Indies" (Amsterdam, 1724-'6); Peyssonel, *Sur les peuples barbares qui ont habité sur les bords du Danube* (1765); Pray, *Annales Regum Hungariorum* (5 vols. fol., Vienna, 1764-'70); Grellmann, *Historische Versuche über die Zigeuner* (Göttingen, 2d ed., 1787); Molnár, *Specimen Linguae Cingaricae* (Debreczin, 1798); Gardiner, "Essays, Literary, Political," &c. (Edinburgh, 1803); Hasse, *Zigeuner im Herodot* (Königsberg, 1803); Bischoff, *Deutsch-Zigeunerisches Wörterbuch* (Ilmenau, 1827); John Staples Harriot, in the "Transactions of the Asiatic Society" for 1831; Cogalniceanu, *Esquisse sur l'histoire, les mœurs et la langue des Cigains* (Berlin, 1837); Predari, *Origine e vicende dei Zingari* (Milan, 1841); George Borrow, "The Zincali, or an Account of the Gypsies of Spain" (2 vols., London, 1841); Von Heister, *Ethnographie und geschichtliche Notizen über die Zigeuner* (Königsberg, 1842); Pott, *Die Zigeuner in Europa und Asien* (Halle, 1844-'5); Bataillard, *De l'apparition et de la dispersion des Bohémiens en Europe* (in the 5th vol. of the *Bibliothèque de l'école de Chartres*, 1844); Böhtlingk, *Die Sprache der Zigeuner in Russland* (St. Petersburg, 1852); Jimenez, *Vocabulario del dialecto gitano* (Madrid, 1854); Liebig, *Die Zigeuner in ihrem Wesen und in ihrer Sprache* (Leipzig, 1863); Ascoli, *Ziguenerisches* (Halle, 1865); Simson, "History of the Gypsies" (London, 1865); Kivasnikoff, "Collection of Songs of the Russian Gypsies," in Russian (Moscow, 1869); Borrow, "Lavo-Lil: Word Book of the Romany or English Gypsy Language" (London, 1874); and numerous articles in the publications of philological societies.

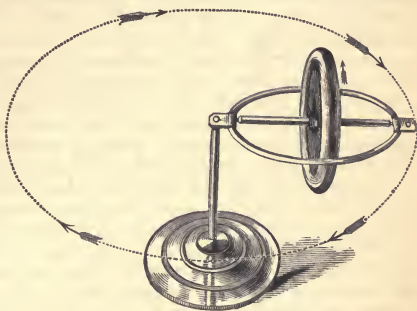
GYPSUM, a common mineral, frequently crystallized, oftener amorphous, and sometimes forming rock masses. Its crystallization is monoclinic; hardness, 1.5 to 2; specific gravity, 2.2 to 2.4; transparent or translucent, vitreous; on cleavage, pearly or silky; colorless and snow-white, but often red, yellow, or brown from enclosed coloring matters. Its transparent variety, called selenite, sometimes occurs in large plates, which have been used for windows. It also frequently occurs in aggregated needle-like crystals, and is then called fibrous gypsum. In its amorphous condition, when compact and translucent, it is named alabaster. More commonly it is white, opaque, and soft, and is then called snowy gypsum. Its chemical composition is expressed by the formula $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$; i. e., it is a hydrated sulphate of lime. Gypsum occurs in nearly all geological formations and countries. In clay and shale it is frequently found in beautifully defined detached crystals, apparently derived from the action of sulphuric acid, liberated by the decomposition of iron pyrites on carbonate of lime. It is also formed where sulphuric acid is generated or discharged from volcanic or other subterranean sources and comes in contact with calcareous matter,

as about sulphur springs and craters of volcanoes. The great repository of gypsum, however, is the water of the ocean, which always holds it in solution, and from which it has been precipitated by evaporation to form all the great masses of this substance. It is also soluble in fresh water in the proportion of 1 part to 400 or 500 of water. The most important deposits known are those of the Paris basin at Montmartre, which are of eocene age, and from which it has taken the common name of plaster of Paris; those of Nova Scotia, Virginia, and Michigan, of carboniferous age; of central New York, Ohio, and Canada West, in the upper Silurian; and in the triassic strata of the far west. It also occurs in the trias at Bex in Switzerland, Vic and Dieuze in France, Cheshire in England, and Stasfurt in Germany. In all these, as in the most important American localities, it is associated with rock salt. Gypsum is known to exist in large quantities in Mexico, South America, Africa, India, Australia, and China.—The origin of the great masses and strata of gypsum found in many countries has been a subject of much discussion. By most writers they are represented to have been produced by the action of sulphuric acid contained in the water of acid springs acting upon strata of limestone. This theory is, however, inapplicable to all the most important deposits, which are undoubtedly derived from the precipitation of gypsum by evaporation from its solution in circumscribed basins of salt water, like the Dead sea and Great Salt lake. This is apparent in the structure of the gypsum beds, which are generally accurately stratified, and not unfrequently alternate with sheets of limestone. Gypsum is also usually associated with greater or less quantities of the salts which are found in sea water, viz., the chlorides of sodium, calcium, magnesium, the sulphate of soda, &c. Of all the solid matter contained in sea water, gypsum is the least soluble, and therefore is the first precipitated. It is thus deposited by itself, and forms continuous and regular strata many miles in extent and of great thickness. The next ingredient which would be thrown down in the evaporation of sea water is the chloride of sodium; and this we find in the strata of rock salt which accompany beds of gypsum. The other salts mentioned have such an affinity for water that they are not found solid, but compose the bitters of the brines of wells and springs. In New York, Canada, and Ohio, gypsum occurs chiefly in the Salina or Onondaga salt group. This formation is made up of a series of earthy sediments interstratified with salt and gypsum, and is plainly the deposit which accumulated at the bottom of a great salt lake, which in the Silurian age reached from eastern New York to the Cincinnati axis. In the western part of this basin, at Sandusky, Ohio, the Salina group contains sheets of regularly bedded strata of gypsum, divided horizontally by thin sheets of carbo-

nate of lime. In the carboniferous age evaporating pans where salt water precipitated its solid contents existed in Nova Scotia, Michigan, Virginia, and Arizona, and later in the triassic age, in the region now occupied by the Llano Estacado and in the Indian territory. In all these localities proof is abundant that the strata of gypsum are precipitated sediments, and that the theory which attributes the formation to the action of acid springs is a fallacy.—The uses of gypsum in the arts are varied and important. When calcined, its combined water is driven off. If now ground to powder and again mixed with water, this water recombines with it, and the mass becomes first plastic, then solid, and takes the form of any model into which it may have been poured. This property of gypsum has many applications in the arts. It makes the most convenient of mortars, and was extensively used by the ancient inhabitants of Mexico as well as those of Egypt in their masonry. The use of gypsum in the formation of plaster casts is too common and well understood to require special notice. When mixed with glue water, plaster of Paris is converted into stucco. If mixed with a solution of borax, alum, or sulphate of potash, and subsequently rebaked and powdered, and again mixed with a solution of alum, it forms a hard cast which takes a high polish. This composition is called Keene's cement if made with alum, Parian if with borax, and Martin's if with potash. In the preparation of plaster of Paris, the gypsum rock is ground between buhr stones until it is reduced to a fine powder. This is calcined by being heated in kettles or stills, the escaping water producing a movement like ebullition. As calcined plaster absorbs moisture from the atmosphere, it should be prepared as wanted, or carefully protected from dampness. Gypsum is sometimes used for the glazing of porcelain. But the principal consumption of it is as a fertilizer for soils. Sulphate of lime enters into the composition of grasses, potatoes, turnips, &c., and these cannot flourish in soils entirely free from it. Its potency, however, is probably due in a far greater degree to its action in fixing volatile and escaping carbonate of ammonia. When this comes in contact with sulphate of lime, double decomposition takes place, carbonate of lime and sulphate of ammonia being formed. Its value as a fertilizer may be readily tested by distributing a quantity of it in a narrow line across a meadow. Where the plaster has fallen, the grass will frequently be so much stronger and greener, that the difference may be seen even at a considerable distance. Gypsum is not unfrequently mingled with, and sometimes shades into, anhydrite, the anhydrous sulphate of lime. Both pass under the name of plaster, the anhydrite being called hard and gypsum soft plaster. The uses to which they are applied are the same.—The commerce in gypsum in the United States amounts to about \$1,000,000 per annum, almost equally divided

between the miner and manufacturer, and between three districts: the Atlantic coast, where the material is derived from Nova Scotia, and the states of New York and Michigan, where it is indigenous and abundant. The importation of gypsum into the United States from Nova Scotia and New Brunswick in 1873 was 118,280 tons, valued at \$117,828. The annual production of gypsum in New York and Michigan may be estimated at about 100,000 tons each.

GYROSCOPE (Gr. *γυρός*, a ring, and *σκοπεῖν*, to examine), a name applied to various instruments designed to illustrate the phenomena of rotation. The most curious and generally interesting form of gyroscope, rightly named "mechanical paradox," although its principle was discovered long before its first construction, consists essentially of a disk revolving on pivots within a ring, having on the line of prolongation of its axis, on one side, a bar or spur with a smooth notch beneath to receive the hard smooth point of an upright support. Thus placed, when the disk is not turning, the whole falls, of course, like any heavy body unsupported



Gyroscope.

ed. Rotate rapidly by unwinding a string, set on the support, but uphold the opposite side of the ring; no peculiar movement then occurs. But if while the disk is rapidly turning, the bar being on the support, the opposite side be set free, the whole, instead of falling, as would be expected, commences a steady revolution in a horizontal circuit about the point of support, moving more rapidly as the primary rotation is expended, and sinking, at first imperceptibly, then more rapidly, until in from one to three minutes it comes to rest. Mathematical analysis shows that when set free, it continually falls and rises, but this motion is not visible. The disk started with its axis in or below the horizontal never rises, without aid, above its first position. Started with high speed above the horizontal, it may rise, and if its connection with the support allow, as when this is by a ball and socket, it may even ascend to a vertical position, and spin as a top. Arrested in its travelling movement, it always descends; hastened, it rises. Checked in any part, it inclines in the direction of that part. In the form now given, the travelling or orbital movement is always in the

direction in which the bottom of the disk is going. But if the axis be prolonged beyond the support, and the disk and ring slightly overpoised by a weight on the other side, then the disk always travels in the direction in which its top is going, and nearly all the phenomena are reversed. Many other curious results may be obtained; it will here be added further only that the disk below the horizontal is always, and above it usually, slowly falling; and that the orbital motion invariably takes place toward that side of the disk in which the force of the rotation about its own axis is most resisted or checked. For proof of this latter principle, let any small wheel be rotated, and while turning rub or seize it upon any side; the rotation in this side being thus checked, and actually or in effect subtracted from, that in the opposite side preponderates, and the wheel is urged toward the side in which the checking occurs.—Perhaps no completely satisfactory explanation of the phenomena can be given without employing the language and processes of the higher mathematics. This has been done in a very complete manner by Gen. J. G. Barnard in a paper published in the "American Journal of Education" for June, 1857, and also published separately under the title "Analysis of Rotary Motion as applied to the Gyroscope" (New York, 1857). The following explanation proposed by Dr. Levi Reuben of New York is perhaps as satisfactory as it is possible to give without the aid of mathematics. There are two facts to be explained: support, and orbital movement, or travelling about the supporting point. For the first, suppose the disk composed of 1,000 equally heavy particles. When it is set rotating and released, each of these particles is, as a separate ball, acted on by two moving forces, that giving the rotation, and that of gravity; but the whole is also held together by the constraining action of cohesion. Suppose that, when released, the axis points below the horizontal: gravity acts in vertical lines and equally on all the particles. Its direction and amount may be represented by equal short pendent threads dropping down from all the particles. If the particles be also supposed in a single plane, the extremities will all lie in a new plane, slightly without and below the plane of the disk, and parallel with it. The forces impressed in giving rotation upon the several particles of the disk will all point in its plane, being represented at any moment by tangents to the circles in which the several particles move, pointing in all directions, and varying in length from the axis, where this is zero, to the periphery, where it is a maximum. But the resultant movements or tendencies of the particles must all terminate in the exact plane in which the gravitative components were seen to terminate. Every particle thus acted upon, then, tends to go outward or forward into the new plane already referred to. The several pressures are to points scattered somewhat widely in that plane; but owing to the

cohesion of all the particles, they are constrained to move or press forward in a body. The effect is as if the whole disk were pulled outward and very slightly downward, while the pivot in the notch reacts or pulls in the opposite direction; and the wheel is supported, in part, as if slung up by strings attached to its two faces and pulled in opposite directions. When the disk is above the horizontal, the new plane is behind or within it; it then pushes against the pivot, and this reacting, there occurs support by opposite pressures, instead of tractions. Thus we discover one reason why no material support is needed for the remote end of the axis; while as a consequence of this view, if the axis be horizontal it must first sink slightly, yet it may be only imperceptibly, before support can occur. This agrees entirely with the results of mathematical analysis. In the second place, why does the disk travel around the supporting point? When not overpoised, gravitation acting downward, and rotation, in the ascending side of the disk, upward, the latter is in effect decomposed into a horizontal and a vertical component, the horizontal expressing itself in the pressure already referred to, the vertical being resisted or antagonized by the force of gravity; the result for each particle being the sum which the latter as a negative quantity would form with the former. In the ascending side, therefore, gravity overbalances, equals, or diminishes, according to the place of each particle, the rotative force of ascent acting upon it; but to the vertical component of the rotative force of all the particles in the descending side it adds alike a quantity of action equal to its own amount. Hence, the whole rotative force in the descending half may be considered as increased, that in the ascending as diminished. There will be some point in the ascending half at which the vertical component of rotation equals gravity; this will become in effect a point of rest, or of no action. This is then the point pierced by the resultant axis—the point about which all the particles under the combined forces will tend to revolve: those in the ascending half starting with less radii to sweep round this point as a centre; those in the descending starting with longer radii, and sweeping in longer curves about the same point. Thus the disk is continually carried to the side in which the action is most checked; and this constitutes the travelling movement. When overpoised on the opposite side, the action of gravity on the disk itself is upward, the axis acting as a lever, the support on which it rests as a fulcrum; the rotative force of the descending particles is now resisted by it; and for a like reason the disk now moves toward its descending side. When not overpoised, the travelling movement of the disk itself introduces a new element into the case, by resisting the rotating of particles in the upper half backward in the course of movement. This checks and diminishes the action in the upper half of the disk,

and constitutes a new source of support by generating a tendency upward; and it is doubtless this part of the action that raises the disk at times to an erect position. The principles thus arrived at explain also why the disk travels faster as its axial rotation lessens, and also when weights are added to it; why in the ordinary form it rises if its motion is hastened with the hand; why, if overpoised, it descends by being hastened, and rises on being delayed in its orbital movement; and in fact, it may safely be said, every phenomenon which the instrument can be made to present. The same explanation, in effect, applies if the rotating body be a sphere, or of any other form. The facts of support and orbital movement, though separately considered, are really but two different expressions of the same phenomenon; the two actions, here for convenience separated, really conspire in one movement, and that is the composition of a rotation caused by gravity with another imparted by the hand. The reason why the rotating body does not fall is, that in such a body, whenever its plane is oblique to the vertical, gravity is no longer allowed to act singly, but must in every instant enter into composition with another force. Hence the body in such case cannot simply fall, but must move toward such new place in space as the combined actions shall determine; and hence, again, the same force which ordinarily produces a vertical fall, here carries a body round in a horizontal circle, or secondarily sometimes even causes it to ascend. The weight

of the rotating disk, however, is in all positions sustained by the support and base on which the apparatus rests. In this explanation, the distance through which the gravitative force acts has been taken as very short, because by experiment and calculation it can be proved that, unless the weight of the ring is very great, the whole downward action of gravity on the disk is very slight compared with that of the rotation first imparted by the hand, sometimes as small as in the ratio of 1 to 40 or 60.

GYROWETZ, Adalbert, a Bohemian composer, born in Budweis, Feb. 19, 1753, died in Vienna in 1850. He studied counterpoint under Sala, and was as well skilled on the violin as on the piano. In 1804 he was appointed director of the orchestra of the imperial theatre in Vienna. Among his operas are "Semiramis," "Agnes Sorel," "The Oculist," and "The Blind Harpist." He also composed melodramas, ballets, numerous instrumental works and vocal pieces, but excelled most in symphonies. His autobiography appeared in Vienna in 1848.

GYULA, a market town of Hungary, capital of the county of Békes, 30 m. N. of Arad; pop. in 1870, 18,495. It is divided by the White Körös river into two distinct villages, surnamed Magyar and Nemet (German), in one of which Hungarian and in the other German is principally spoken. It has a Greek united, a Greek non-united, and a Protestant church, a castle, a court house, and several oil mills. The vine is extensively cultivated in the neighborhood, and there is a trade in wine, salt, and cattle.

H

H, THE eighth letter in the Latin alphabet, and in others derived directly from it, as English, French, German, and Italian. It was also the eighth letter in the original Greek alphabet, where it was represented by the character Η, and so appears in inscriptions; but the letter was in time dropped, and the character was used for the new letter *eta*; and the two halves (ⱥ and ⱦ), subsequently modified into ' and ', designated as the "rough" and "smooth" breathings, were superscribed over the initial vowel of a word; the initial *v* always having the rough breathing (ϝ), while the other vowels may have either. The initial *p* is always aspirated, and when this letter is doubled in the middle of a word, the first has the rough and the second the smooth breathing (ϝϝ). H in English, when sounded, is a mere emission of the unvoiced breath; but in producing it the vocal organs are placed in position to form the succeeding vowel; thus in uttering *he*, *ha*, or *ho*, the lips and tongue are in different positions. H is sometimes silent, as in *hour*, *heir*, *honor*; that is, the breath is emitted so gently as to be inaudible; in a few words, such as *humble* and

humor, the usage varies; but when audible it has but one sound, as in *hat*. There is a vulgarism not uncommon in England of reversing the proper usage at the beginning of a word; as *ouse* for house, *happle* for apple. At the end of a word it is silent, or at most gives additional force to the preceding vowel. H enters into combination with other letters, usually modifying their sound. *Ch*, as in *church*, is properly a distinct letter (and is so regarded in Spanish, the only language in which it is the same as in English), the sound of which is only approximately represented by *tsk*; in some words of French origin, as *chaise* and *machine*, it is equivalent to *sh*; when it is the representative of the Greek χ, it is usually sounded like *k*, as in *chorus*, but occasionally, as in *archbishop*, it assumes the normal English sound. In *gh*, at the beginning of a word, the *h* is silent, as in *ghost*; in other positions both letters are usually silent, as in *light*, *bough*, but occasionally, as in *laughter*, they sound like *f*. *Ph* is merely the representative of the Greek φ, and sounds like *f*. *Rh* is only used to represent the Greek ρ. *Th* has two sounds, as in *thin* and in *that*. In *wh*, the

sound of *h* precedes that of *w*, as in *what* (*hwat*); in *who*, *whom*, *whose*, *whole*, the *w* is silent. Many persons drop the *h* in this combination, pronouncing *wig* for *whig*, *wip* for *whip*, &c.—In German music, *H* denotes the 7th diatonic interval, or the 12th string of the chromatic scale. This note was anciently *B*, and is so yet in Dutch and English music; but after the introduction of the chromatics, both itself and its flat (which was first contrived) being named *B*, in order to distinguish them, one was made of square shape. From this *B quadratum* was formed the \flat (French *bé carré*) and the German *H*, while its flat became *b*, whence the sign \flat (French *bé mol*).

HAARLEM, *Haerlem*, or *Harlem*, a city of the Netherlands, in the province of North Holland, on the navigable river Spaarne, 3 m. from the sea, 10 m. W. of Amsterdam, and 17 m. N. N. E. of Leyden, with both which cities it communicates by canals and railways; pop. in 1872, 32,-

schools, a gymnasium, an academy of arts founded in 1752, and the Teyler institute; and in the S. outskirts are many nursery gardens, renowned for tulips, hyacinths, and other bulbous plants, in which an extensive trade is carried on. It possesses manufactories of cotton, silk, linens, velvets, ribbons, damasks, lace, jewelry, sail cloth, and soap, and has refineries of salt, tanneries, and dye works. Prior to the discovery of the art of bleaching by chlorine, Haarlem enjoyed celebrity for its bleacheries. Large quantities of linen were supplied to England, and hence came to be called *hollands*.—Haarlem was a flourishing town in the middle of the 12th century, and figured in the wars between the Dutch and West Frisians. The revolted peasants seized it in 1492, but lost it the same year. Having joined the revolt of the Netherlands against the Spaniards it was besieged by the troops of Alva in 1572-'3. The citizens made one of the most heroic defences on record. After seven months' siege, during which the Spaniards lost 10,000 men, and twice breached the walls, but were unable to obtain entrance, they turned the siege into a blockade, and placed a fleet on the lake to cut off supplies. The defenders, who originally numbered 4,000, including some German auxiliaries and a corps of 300 women, being reduced to 1,800, and the last mouthful of food eaten, proposed to place the women and children in their centre, fire the city, and cut their way through the besiegers. The Spaniards now offered terms if they would surrender. The proposal was accepted. Alva's troops marched in, disarmed the inhabitants, and the 57 hostages were put to death; and four executioners were kept constantly busy until they ceased from fatigue after 2,000 persons had been butchered, when 300 remaining victims were tied in twos, back to back, and cast into the lake. William of Orange retook the city in 1577.

HAARLEM MEER, or *Lake of Haarlem*, a former lake 14 m. long and 10 m. broad, covering 70 sq. m., communicating N. with the Zuyder Zee by the inlet called the Y, and S. with the Old Rhine, and occupying, with an average depth of water of 13 ft., the area between the cities of Haarlem, Leyden, and Amsterdam. This sheet of water was formed in the 16th century by an inundation which united four ponds into one, and destroyed several villages. It gradually encroached on the land, till in the present century it covered 45,000 acres. It was



Quay of the Grain Market, with St. Bavon's Church.

156. The city is well built, clean, and intersected by canals. A picturesque gateway on the high road to Amsterdam is a part of the old fortifications; the ramparts have been converted into public promenades. Most of the public edifices are built around a handsome square, in the centre of which is a bronze statue to Laurens Coster, whom the Dutch regard as the inventor of printing. The principal buildings are the town hall, formerly the residence of the counts of Holland, the palace of the states general containing a gallery of paintings, 12 Protestant and three Roman Catholic churches, and one Old Catholic (Jansenist) church. It is the seat of a Catholic and an Old Catholic bishop. St. Bavon's church, erected in the 15th century, is the largest ecclesiastical edifice in Holland, and is celebrated as containing the great organ constructed in 1738, and which until lately was the largest in the world. The city has a botanical garden, numerous public

fered terms if they would surrender. The proposal was accepted. Alva's troops marched in, disarmed the inhabitants, and the 57 hostages were put to death; and four executioners were kept constantly busy until they ceased from fatigue after 2,000 persons had been butchered, when 300 remaining victims were tied in twos, back to back, and cast into the lake. William of Orange retook the city in 1577.

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drained between 1839 and 1852, and almost the whole of it was reclaimed. It forms now a commune with a population of about 10,000. (See DRAINAGE.)

HABAKKUK, one of the twelve minor prophets, of whose birth or death we know with certainty neither the time nor the place. His prophecy is variously dated by different scholars from about 630 to 590 B. C. It relates chiefly to the threatened invasion of Judea by the Chaldeans. The style is highly poetical, and the ode or prayer of the 3d chapter is probably unrivalled, not only for splendor of diction and subject, but for sublimity, simplicity, and power. See Delitzsch, *Der Prophet Habakuk*, *ausgelegt* (Leipsic, 1843), and *De Habacuci Prophetæ Vita atque Ætate* (2d ed., 1844).

HABEAS CORPUS, an ancient English writ, used for a variety of purposes from the remotest time. It is addressed to a sheriff or other officer, and commands him to have the body of the person named at a certain place and time. When all writs were in Latin, the characterizing words of this writ were *ut habeas corpus*, and the name has long survived the use of these words in the writ. One of the purposes for which it was used was to recover freedom which had been wrongfully taken away. Personal liberty was always asserted by the common law from its earliest ages; and it was always assailed by kings who would be tyrants, and with an earnestness proportioned to their tyranny. Hence it became necessary to declare this principle in the most solemn manner in Magna Charta. It is there said that "no man shall be taken or imprisoned but by the lawful judgment of his peers, or by the law of the land;" and this clause, more than any other, has given to that instrument the name of the palladium of English liberty, a name which is deserved rather by the writ of habeas corpus. For, on the one hand, the great charter did not enact this as a new rule of law, but only declared it to be the law of the land; and, on the other, its force and influence gradually faded, in despite of repeated formal confirmations; and this law became actual and operative only by means of the habeas corpus. This writ was issuable from the king's bench; and it was used to protect or restore liberty, by bringing the prisoner before the court, whose duty it was to order his immediate discharge if he were not restrained of his liberty according to law. But it was evaded by courts and sheriffs, who were disposed to support royal or ministerial usurpations; and it became so powerless that early in the reign of Charles I. the court of king's bench formally decided that they had no power to release any person imprisoned without any cause assigned, if he were imprisoned by the express command of the king, or by the lords of the privy council. The petition of right, passed in 1628, asserted the illegality of this decision, and declared that "no freeman should be imprisoned or detained without cause shown, to which he may make

answer according to law." But the means of enforcing this rule were still imperfect, and personal liberty was still violated; and by 16 Charles I., ch. 10, various provisions were enacted, intended to make the writ more effectual. But this was not enough. The judges still continued to refuse the writ at their pleasure, or to insist that it could be issued only in term time; and prisoners were sent to distant jails, and sheriffs and jailers refused to obey it; or if the party imprisoned were brought before an examining court, his liberty was still withheld on frivolous pretences. At length, in the 31st year of the reign of Charles II. (1679), what is now always understood by the habeas corpus act was enacted. It consisted of a variety of provisions, devised with so much skill, and so well adapted to give each other mutual support, that it may safely be asserted that personal liberty will be safe in England and the United States so long as this law remains in force. Evasion of it is almost impossible; and it can be made ineffectual only by a positive and open violation of its essential provisions, or by a distinct denial of its interposition. The English statute has been copied in the United States, without essential change; the variations from it being only such as would, in the opinion of the various legislatures, make its provisions more stringent, and the security it gives to liberty more certain and available.—The provisions of the statutes of habeas corpus, now in force in the different states, may be stated generally thus: 1. The writ commands the sheriff, or other person to whom it is directed, to have the body of the person who is said to be restrained of his liberty forthwith before the justice issuing it, or some other tribunal competent to try the questions the case may present; and to summon the person restraining the alleged prisoner to be there also, and bring with him the cause of the restraint; that all parties may then and there submit themselves to whatever may be lawfully adjudged and ordered in their behalf. The language varies in the different statutes which give the form of the writ; but it is always substantially as above. 2. The writ must be granted, as of right, by any of the justices of the higher courts, and, in their absence or inaccessibility, by any of those of a lower court, down to justices of the quorum; the law covering in this respect a wide range, so as to insure to every applicant some one from whom this redress or remedy may come. 3. It must be granted at any time when it is prayed for, whether a court be sitting or not. 4. It must be granted either to the party himself restrained of his liberty, or to any one applying for him; and if his name be unknown, the best description which can readily be given is sufficient. 5. The application must be in writing, and must be verified by the oath of the applicant. 6. The sheriff or other officer to whom it is directed must render prompt obedience, and make immediate service, and return the

writ forthwith with a full statement of his doings. 7. It must be returned before the proper magistrate at chambers, if a court to which it is made returnable be not then in session. 8. Upon the return, the alleged prisoner being present, the case is tried; and unless sufficient cause for his imprisonment is shown, he is ordered to be discharged at once. 9. If not wholly discharged, the court or magistrate may order him to be discharged on giving reasonable bail, if he be held for any bailable offence or cause. 10. In some of the states it is provided that the writ may not issue if the party restrained be imprisoned for crime, or in execution civil or criminal, and by lawful warrant. In others these exceptions are not made, but if facts like these appear on trial, the prisoner is remanded. 11. In general, after a party has been discharged on habeas corpus, he cannot be again imprisoned or restrained of his liberty for the same cause. 12. The issuing of the writ by the magistrate applied to, and prompt and full obedience to it by the officer or other person to whom it is directed, are secured by very heavy penalties; and also by the fact that any applicant to whom the writ is refused by one magistrate may apply to another, and the number of those to whom he may thus resort is so large that it is hardly possible for them all to be corrupted, or for any reason indisposed to render due obedience to the law.—The vast importance of this law can be appreciated only by those who have studied the history of despotism; although it discloses only what might have been inferred with almost equal certainty from the reason of the thing. Whether the ruling authority of a nation (be it in the hands of one or of many) shall be absolute or subordinated to law must depend, in the last result, upon its power over the persons of those who are subject to it. Whatever be the law, if there be a sovereign who may disregard it, and put in strict imprisonment those who would resist him; if he may substitute his own commands for law, and take away from society and from all power of resort to law those who do not obey him; it is perfectly obvious that there can be no disobedience and no resistance which is not rebellion if it be put down, or revolution if it succeed. The histories of France and of England offer the most perfect illustration of this. Beginning from the feudal ages, they stood then about upon an equality in respect to the power of the sovereign and the personal rights of the subject. Under some of her monarchs, of the Plantagenet and Tudor families, England seemed to be yielding herself up to a more absolute tyranny than was known to her neighbor. But as the ages went on, it became apparent in France that the subjection of the citizen to the sovereign became with every generation more complete. By insidious rather than open increase, the power of the king, or rather the power of ministers who acted in the name of the king, to imprison at their pleasure whom they would,

for political or personal, public or private reasons, became so entirely established, that every minister of the crown had, it is said, a large number of blank *lettres de cachet* (or letters under the privy seal of the king) which he could fill with names at his pleasure, and by which the police were authorized and commanded to imprison the party named and hold him in prison at the pleasure of the minister. The Bastille became a recognized instrument of state; and in its cells lay those who were placed there only at the suspicion or the caprice of some minister, and who remained there only because they were forgotten. Of course this state of things could not last; for no one acquainted with human nature could doubt that such irresponsible and enormous power would be enormously abused, and lead its possessors into folly and insanity. Therefore the French revolution came to do the work which must be done, and only revolution could do, and therefore the reign of terror almost necessarily replaced the despotism which had been its parent. If we now turn to England, we shall see that in the Anglo-Saxon times despotism was rarely attempted, and never successful; that the laws and institutions of those days are all founded on the presumption of personal liberty and rights; that this element of character might for a time be suppressed or enfeebled, but that it could never be annihilated; that it rose from time to time into prominence and activity, and, as opportunity offered or could be made, gradually asserted itself: first in the fact of a common law, which the courts regarded as binding upon them; then in the recognition of personal liberty and right as an unquestionable principle of common law; then by such timely assertions as in Magna Charta, in the petition of right, and finally in the act of habeas corpus.—That this act is sufficiently valued in the United States may be inferred from the fact that the federal constitution (art. I., sec. 9, No. 2) provides that "the provisions of the act shall not be suspended, unless when in case of rebellion or invasion the public safety may require it;" and there is a provision to the same effect in some of the state constitutions. Everywhere the statute itself is enacted, and, so far as words can have the effect, made stringent and effectual. By various acts of congress jurisdiction is conferred upon the federal courts to issue the writ of habeas corpus in cases of confinement by federal or under pretence of federal authority, and also in other cases where it may be necessary to the enforcement of federal jurisdiction. How far the state courts have the right to inquire into unlawful restraints upon personal liberty under claim of federal authority has been the subject of no little discussion and conflict of decision. The supreme court of the United States has finally determined that though the state courts may issue the writ in all cases, yet when it appears by the return that the restraint is under a claim of federal authority, they can pro-

ceed no further, but must leave the validity of the claim to be determined by the federal courts.

—The technical name of this writ is *habeas corpus ad subjiciendum*, from the requirement contained in it that the alleged prisoner and the persons restraining him should "submit themselves to the order of the court." It is sometimes called also *habeas corpus cum causa*. *Habeas corpus ad testificandum* was formerly used to compel witnesses to testify in certain cases, and *habeas corpus ad satisfaciendum* was employed to obtain satisfaction of certain judgments. But these are now obsolete. This writ is now frequently resorted to by parents of minors who have enlisted without their permission, by parents who wish to obtain possession of children withheld from them, and for similar purposes. It has been solemnly decided that the *habeas corpus* act can be suspended only by the legislature; and that the proclamation of martial law by a military officer is not sufficient.

HABENECK, Antoine François, a French musician, of German parentage, born in Mézières, June 1, 1781, died in Paris in February, 1849. His father, a musician of a French regiment, gave him lessons on the violin, of which instrument he became a distinguished master under the tuition of Baillot. The empress Josephine gave him a pension of 1,200 francs, and he became adjunct and successor of Kreutzer as solo player, and from 1806 to 1815 he presided over the orchestra at the *conservatoire*; and he was the first to produce there the music of Beethoven, which through his perseverance and enthusiasm gradually acquired universal popularity. From 1821 to 1824 he was director of the opera; and he was leader of the orchestra till 1846, and in this capacity and as a violinist he was without a rival, though he composed little. His younger brothers **CORENTIN** and **JOSEPH** became also known as excellent violinists.

HABERSHAM, a N. E. county of Georgia, bordering on South Carolina, and containing the sources of the Chattahoochee, Broad, and other rivers; area, about 500 sq. m.; pop. in 1870, 6,322, of whom 949 were colored. It is traversed by branches of the Blue Ridge, between which are fertile valleys. Iron is abundant; rubies, carnelians, and occasionally diamonds have been found; and the gold mines were formerly among the richest in the state. The chief productions in 1870 were 5,409 bushels of wheat, 4,795 of rye, 132,824 of Indian corn, 5,915 of oats, 16,297 of sweet potatoes, 25,127 lbs. of tobacco, 83,241 of butter, and 79 bales of cotton. There were 695 horses, 1,354 milch cows, 2,244 other cattle, 4,729 sheep, and 7,370 swine. Capital, Clarkesville.

HABINGTON, William, an English poet, born at Hindlip, Worcestershire, Nov. 5, 1605, died there, Nov. 13, 1645. He was educated at the Jesuit college of St. Omer, and at Paris; but he showed no inclination for a life of celibacy, and married Lucy Herbert, the daughter of Lord Powis. He lived mostly in the coun-

try, and his life passed quietly. His works, marked by nice fancy and moral elevation, are: "Castara," a collection of poems addressed to his wife (4to, London, 1634; with a preface and notes by Charles A. Elton, 12mo, Bristol, 1812); "The Queene of Aragon, a Tragi-comedie" (fol., 1640), revived in 1666 with a prologue and epilogue by Samuel Butler, author of "Hudibras;" "The Historie of Edward IV." (1640), said to have been partly written by the poet's father; and "Observations upon the Historie of Henry the Second's Association of his eldest Sonne to the Regal Throne" (8vo, 1641).

HACHETTE, Jean Nicolas Pierre, a French mathematician, born in Mézières, May 6, 1769, died in Paris, Jan. 16, 1834. At the age of 19 he was made designer to the professors of physics and chemistry at the engineering school of Mézières. In 1792 he became professor of hydrography at Collioure, in 1794 adjunct professor of descriptive geometry in the polytechnic school in Paris, and in 1810 adjunct professor in the Parisian faculty of sciences and the normal school. On the restoration he was dismissed from the polytechnic school on account of his political sentiments, and although elected a member of the academy of sciences in 1823, he was not allowed to take his seat until after the revolution of 1830. He wrote many works on mathematics and physics.

HACKBERRY (*Celtis occidentalis*), the popular name of a tree belonging to the nettle family (*urticaceae*), and the elm suborder (*ulmaceae*). In different parts of the country it is also known as sugarberry, nettle tree, sweetgum, false elm, beaverwood, and hoop ash. The ge-



Hackberry (*Celtis occidentalis*).

neric name *celtis* is the Greek for the lotus, the berries of *C. australis*, of southern Europe, being supposed to have been the food of the *lotophagi*. The hackberry is found as a small straggling bush, and as a medium-sized or a large tree. It has a very close resemblance in

general appearance to the elm, except that its branches are more horizontal, and instead of a winged fruit it bears singly or in pairs a globular drupe, about the size of a wild cherry, dark purple when ripe, and sweet and edible. The wood, though fine-grained and compact, is not heavy, and when exposed to the weather is not durable; it splits readily and is sometimes used for rails and even for baskets; it is said to make excellent charcoal. The tree extends from New England to the Pacific, and southward to Texas; and being found in widely different situations, it presents great variation in the size, form, and thickness of the leaves. At least a dozen forms have from time to time been described by botanists as species; but as every intermediate state can be found between these nominal species, the best authorities unite them all under *C. occidentalis*. This tree in the northern states is rarely found growing in great numbers in any one locality, and is perhaps the least known of any of our forest trees; at the south it is more abundant, and attains a large size on the coast as well as on the river banks, where specimens 60 to 80 ft. high, with a trunk 3 to 5 ft. in diameter, are not rare. Tree planters seem to overlook the merits of the hackberry as an ornamental tree, and it is better appreciated in Europe than with us; as a lawn tree it presents an elegant form, and is remarkably free from the attacks of insects; it holds its leaves until late in autumn, when they turn yellow and fall all at once. A dwarf hackberry is found in western Texas, which seems to be a distinct species; it is a crooked shrub of a few feet in height, and was called by Torrey *C. pallida*. The wood of the European *C. australis* is valued for making furniture, and especially for carving; the very strong and flexible shoots serve for making hay forks, whip handles, and the like.

HACKEE. See CHIMPUNK.

HACKERT, Philipp, a German artist, born at Prenzlau, Prussia, Sept. 15, 1737, died near Florence, April 28, 1807. He studied painting with his father, and afterward at Berlin, and went to Paris in 1765, and to Italy in 1768. In Rome the empress Catharine of Russia ordered of him two pictures to represent the naval battle of Tchesme, July 5, 1770, and the burning of the Turkish fleet. In order that he might understand the appearance of the explosion of a ship, Count Orloff blew up one of his frigates before him. After the task was finished the empress ordered six pictures of the victories of the Russians in the Mediterranean. He resided for some time in Naples, but was compelled by the revolution of 1799 to go to Florence; and he purchased a villa near that city, in which he resided until his death. His contemporary reputation was beyond his merits. He engraved many of his own paintings, and wrote *Sull' uso della vernice nella pittura* (1788), and *Theoretisch-praktische Anleitung zum Landschaftzeichnen* (1803). Goethe wrote a biographical sketch of Hackert (1811).

HACKETT, Horatio Balch, an American Biblical scholar, born in Salisbury, Mass., Dec. 27, 1808. He graduated at Amherst college in 1830, and studied theology at Andover, and afterward at Halle and Berlin. He spent a year as tutor at Amherst college, and four years as professor of ancient languages at Brown university, and in 1839 became professor of Biblical literature in the Newton theological institution. In 1851-'2 he travelled in Italy, Egypt, Palestine, and other countries. In 1858-'9 he resided several months in Athens, for the purpose of studying modern Greek, as auxiliary to the interpretation of the New Testament, and visited places in and near Greece possessing a Biblical interest. In 1869 he resigned his professorship at Newton, and in 1870 became professor of New Testament Greek in the Rochester theological seminary. He has published Plutarch's *De Sera Numinis Vindicta*, with notes (Andover, 1844); a translation of Winer's Chaldee grammar, with additions (1845); "Hebrew Grammar" and "Hebrew Reader" (1847); a "Commentary on the Acts" (Boston, 1851; new ed. greatly extended, 1858); "Illustrations of Scripture suggested by a Tour through the Holy Land" (1855); translation of the "Epistle to Philemon, with Notes" (1860); "Memorials of Christian Men in the War" (1864); translation of Van Oosterzee's "Commentary on Philemon," for Lange's "Commentary" (1868); and translation of Braune's "Commentary on Philippians," with additions, for Lange's "Commentary" (1870). He contributed to the English edition of Smith's "Dictionary of the Bible," and with Dr. Ezra Abbot edited the American edition. He also edited the American edition of Rawlinson's "Historical Illustrations of the Old Testament," with notes and appendix (1873). He is one of the American revisers of the English Bible.

HACKETT, James Henry, an American actor, born in New York, March 15, 1800, died at Jamaica, L. I., Dec. 28, 1871. He entered Columbia college in 1815, but remained only a year. In 1817 he began the study of law, and in the following year became a clerk in a grocery store. In 1819 he married an actress of the Park theatre. He was in mercantile business in Utica and in New York from 1820 to 1825, but failed, and then devoted himself to the stage, making his first appearance at the Park theatre, March 1, 1826, as Justice Woodcock. On March 10 he made a decided success as Sylvester Daggerwood. He went to England the same year, and also made successful professional visits there in 1832, 1840, 1845, and 1851. Upon his return from his first visit to England he appeared as Rip Van Winkle, and subsequently as Monsieur Mallet and Falstaff. In 1829-'30 he was associated in the management of the Bowery and Chatham theatres in New York. In 1837 he managed the National theatre, and in 1849 he was lessee and manager of the Astor place opera house, and lost more than \$4,000 by the Forrest and

Macready riots. In 1854 he engaged Grisi and Mario, and gave successfully a series of Italian operas throughout the United States. Until 1869, when he withdrew from the stage, he continued to act at intervals. His Falstaff was thought to be his best character, and in it he made his last appearance in New York, Dec. 25, 1869. He projected the plan for the Shakespeare monument in the Central Park, and the corner stone was laid under his auspices at the Shakespeare tercentenary, April 23, 1864. He published "Notes, Criticisms, and Correspondence upon Shakespeare's Plays and Actors" (New York, 1863).

HACKLÄNDER, Friedrich Wilhelm von, a German author, born at Burtscheid, near Aix-la-Chapelle, Nov. 1, 1816. He qualified himself for mercantile pursuits at Elberfeld, to which he returned after serving for a short time in the army. Becoming dissatisfied with commercial life, he removed to Stuttgart, where he published in 1841 *Bilder aus dem Soldatenleben in Friedenszeit und Wachtstubenabenteurer*, which made him famous. In the same year he accompanied Baron Taubenheim, the grand master of the horse, to the East for the selection of Arabian horses for King William of Württemberg. After his return he published sketches of oriental life (*Daguerrotypen*, 2 vols., 1842), and *Pilgerzug nach Mekka* (1847). The king gave him employment in the exchequer, and in 1843 he became secretary and travelling companion of the crown prince, the present King Charles. His active duties terminated in 1849, though he retained a salary. He then joined the suite of the Austrian general Radetzky during the war with Sardinia, and published *Soldatenleben im Kriege* (2 vols., 1849-'50). His visit to Spain in 1854 he described in *Ein Winter in Spanien* (2 vols., 1855). In 1859 he went to the headquarters of the Austrian army at the request of the emperor Francis Joseph, who afterward conferred upon him a patent of hereditary nobility. In the same year he was appointed director of royal buildings and gardens at Stuttgart, and contributed greatly to the embellishment of that city. He lost his office on the death of King William in 1864, but continued to reside in Stuttgart. His complete works were published in 48 vols. in 1863-'6, but now (1874) number about 70 vols., include, besides his popular military sketches and books of travel, a number of comedies, of which *Der geheime Agent* (1850) was the most successful; delineations of his early mercantile experiences (*Handel und Wandel*, 2 vols., 1850; translated into English by Mary Howitt, "Behind the Counter," 1868); and stories, tales, and novels, which place him in the front rank of humorous and pathetic writers. Many of them have been translated into French, and Mrs. Wister translated one of them into English under the title "Enchanting and Enchanted" (Philadelphia, 1870). The following are among his most elaborate novels: *Europäisches Sklavenleben* (4

vols., 1854); *Der neue Don Quixote* (5 vols., 1858); *Künstlerroman* (5 vols., 1866); *Das Geheimniss der Stadt* (3 vols., 1868); *Der letzte Bombardier* (4 vols., 1870); *Geschichten im Zick-Zack* (4 vols., 1870-'71); *Der Sturmvogel* (6 vols., 1871-'2); and *Kainzeichen* (1874).

HACKMATACK. See LARCH.

HADDINGTONSHIRE, or East Lothian, a county of Scotland, bordering on the frith of Forth, the North sea, Berwickshire, and Edinburghshire, or Mid-Lothian; area, 280 sq. m.; pop. in 1871, 37,770. The surface rises gradually, though with slight undulations, from the coast toward the Lammermuir hills. It is divided by the river Tyne into two nearly equal portions. The climate is heathful, but variable. The soil is in general fertile. The low lands of the north and west are extremely productive, and the districts adjoining the Lammermuir range are adapted to pasturage. The principal crops are wheat, potatoes, and turnips. Sheep and cattle are reared in the hill districts. There are no manufactures of any importance. Capital, Haddington, on the Tyne, 17 m. E. by N. of Edinburgh; pop. about 4,000.

HADDOCK. I. A soft-rayed fish of the cod family, and genus *morrhua* (Cuv.). This well known species varies in length from 1 to 2 ft., and in weight from 2 to 6 lbs., though some have been taken weighing 17 lbs. The color is dark gray above and silvery gray below, with a jet-black lateral line, and an oblong dark blotch on each side, on a line with and just above the pectorals. The body is stout in the anterior half, tapering backward; the head is large, flattened between the eyes, and the snout prominent; the eyes large, with bluish iris; the upper jaw the longer, with several rows of sharp-pointed teeth, and a single row in the lower; a very minute barbule suspended from the chin. There are three dorsals, the first high and triangular, whence its name of *M. aeglefinus* (Linn.); the pectorals are triangular, and the ventrals are in front of them, under the throat; there are two anals, and the caudal is emarginated. The haddock is found everywhere on the American coast from New York to the arctic regions; they occur in immense



Haddock (*Morrhua aeglefinus*).

shoals, often changing ground as their food becomes exhausted; they are found on our coast from spring to autumn, at the season when cod are scarce. It is an excellent fish when eaten fresh. The spawning time is in early spring; its food consists of small fish, crustaceans, mollusks, and marine worms;

from its voracity it is a ready biter, and is easily caught; the fishery is valuable to New England and the British provinces, and is pursued in the same manner as for cod, and in deep water. The haddock is equally abundant on the coast of northern Europe, and is very common in the English markets; it is found in the arctic seas, supplying food to the inhabitants of Greenland, and to the seals and other aquatic mammals of the northern regions. The name "young haddock" is sometimes given to the pollack, a gadoid fish of the genus *merlangus* (Cuv.). II. The Norway haddock is the *sebastes Norvegicus* (Cuv.), an acanthopterous marine fish of the family *sclerogenidae* or "mailed cheeks." It attains a length of from 1 to 2 ft.; the body and the upper parts of the head are covered with scales; the gill covers are spiny; the teeth are numerous, small, equal, in both jaws, and on the vomer and palate bones; the single dorsal is partly spinous, as are the anal and ventrals. The color of the living fish is bright red, with a black blotch on the posterior part of the gill covers; after death the lower parts become white; the iris is yellow. It is found on both sides of the Atlantic, and on the American coast from New York to the far north; it is called here rose fish, red perch, and snapper. It is abundant in Newfoundland, where it feeds on small fish. The spines of the dorsal are used as needles by the Greenlanders and Esquimaux.

HADERSLEBEN (Danish, *Haderslev*), a city of Prussia, in the province and 52 m. N. of the city of Schleswig, on the Hadersleben fiord, a small arm of the sea connecting with the Little Belt; pop. in 1870, 8,259. It consists of an old and a new town, and has a normal school, gymnasium, hospital, and a monument to Luther. There are several breweries and distilleries, and a glove factory. The harbor is only adapted for small vessels. The outer harbor is at the custom house of Stevelt. Hadersleben was formerly an imperial city, the seat of a bishop before the reformation, and had a strong castle. In the first Schleswig-Holstein war the city was occupied by the Germans April 9, 1849, and in the second, Feb. 14, 1864.

HADÉS (Gr. Ἅιδης), in Grecian mythology, a name originally given to the king of the lower or invisible world, but afterward applied to the infernal regions, while the king came to be known as Pluto. Hades was a place of darkness, the residence of Pluto and Proserpine, and the abode of the dead. Its gates were kept closed, that no shade might escape to the world of light, and were guarded by the terrible many-headed dog Cerberus.

HADJI, an Arabic word signifying pilgrim, *hadj* being the term used by Mohammedans for the sacred pilgrimage to Mecca. A certain part of the ceremony which takes place at Mecca on the arrival of the pilgrims is also called *hadj*. The Mohammedan theologians define the original meaning of *hadj* to be "aspiration," and they consider it expressive of the

sentiment that man is but a wayfarer on earth travelling toward another and a better world. Every Mohammedan is bound once in his life to visit the holy city Mecca, and a Mohammedan who has made the pilgrimage afterward bears the title Hadji prefixed to his name; as Hadji Ibrahim, Hadji Mohammed.

HADJI KHALFA, the surname of **MUSTAPHA BEN ABDALLAH**, also known under the title of Katib Tchelebi (noble secretary), a Turkish historian, born at Constantinople, died there in 1658. His father was employed in the ministry of finance, and he entered the service in 1622. In 1626 he was present at the siege of Erzerum. In 1629 he made the campaign of Mesopotamia, and in 1633 the pilgrimage to Mecca. Having returned to Constantinople, he undertook his great bibliographical work. He resigned his office in 1642, but in 1648 was appointed *khalfa* (minister of finance). He wrote in Turkish, Arabic, and Persian. His most important work is *Keshf ul-tzunân*, a bibliographical lexicon in Arabic, in which are titles of more than 18,000 Arabic, Persian, and Turkish books, with brief notices of the authors. A complete edition of the text, with a Latin translation, was published by Flügel, under the title *Lexicon Bibliographicum et Encyclopædicum* (7 vols., London, 1835-'58). He also wrote some historical works, of which the most important are, *Takwim at-tevarikh* ("Chronological Tables," Constantinople, 1733; Latin translation by Reiske, Leipsic, 1766); *Jihân numâ* ("Mirror of the World," Constantinople, 1732; Latin translation by Norberg, Lund, 1818); and *Tohfet al-kobar fi asfar al-behar* (Constantinople, 1728; English translation by Mitchell, "History of the Maritime Wars of the Turks," London, 1830). His autobiography is appended to the *Takwim at-tevarikh*, and has been translated into German by Von Hammer.

HADLEY, James, an American scholar, born in Fairfield, Herkimer co., N. Y., March 30, 1821, died in New Haven, Conn., Nov. 14, 1872. When nine years old he was accidentally lamed for life, and devoted himself to study, soon acquiring a mastery of ancient languages. He graduated at Yale college, at the head of his class, in 1842, was for a short time tutor in Middlebury college, Vermont, where he displayed remarkable mathematical ability, and graduated at the theological seminary in New Haven in 1845. In that year also he became tutor, in 1848 assistant professor, and in 1851 professor of Greek in Yale college, holding the chair until his death. He was familiar with Sanskrit, Hebrew, Arabic, Greek, Latin, Armenian, Gothic, and many modern languages, including Swedish and Welsh, and had given special attention to early forms of English; and he was master of the methods and main results of comparative philology. He was a leading member of the American oriental society, and during the last two years of his life its president. He was vice president of the

philological association, before which he read a number of papers of value. He was one of the American committee for the revision of the New Testament now in progress. His acquisitions were all made during the regular discharge of his duties as a teacher, in which position he was most successful. He wrote the "History of the English Language" in the introduction to Webster's Dictionary, and was the author of a "Greek Grammar" (1860); "Elements of the Greek Language" (1869); an essay on the Greek accent, republished in German in Curtius's *Studien zur griechischen und lateinischen Grammatik*; an article on the "Language of the New Testament," in the American edition of Smith's "Dictionary of the Bible"; "Lectures on Roman Law" (1873); and "Essays Philological and Critical," edited by Prof. W. D. Whitney (1873).

HADLEY, John, an English astronomer, died Feb. 15, 1744. The time and place of his birth, as well as the particulars of his life, are unknown. He became a fellow of the royal society in 1717, and is chiefly known as the reputed inventor of the instrument commonly called Hadley's quadrant, of which he published an account in the "Transactions" for 1731. It is now believed, however, that Sir Isaac Newton and Thomas Godfrey are entitled to the honor of the invention. The claims of Godfrey and Hadley were investigated by the royal society, and it was decided that both were original inventors, and a prize of £200 was awarded to each. (See GODFREY, THOMAS.)

HADRAMAUT, a district of S. Arabia, lying along the shores of the Indian ocean. Its limits are not well defined, but it is bounded generally N. by the Dahna or great desert, N. E. by Oman, S. by the sea, and W. by Yemen. Its coast line extends in a N. E. direction from lon. 45° to 56° 30' E., but some authorities limit it to less than 200 m. It is supposed to extend inland about 120 m. The coast is low, excepting where some spur from the mountains inland forms a projecting cape. Back of the lowlands a range of mountains, which stretches from Yemen to the regions bordering on Oman, rises in terraces to a considerable height, and behind it an elevated plateau, diversified by occasional peaks and numerous valleys, descends gradually into the desert. But little was known of the interior until the explorations of the baron von Wrede, who visited the wady Doan in 1843. He describes this valley as a deep gap which bisects the table land, beginning about 80 m. N. W. of Makallah and ending 120 m. E. of it on the Tehama or lowland near the sea. Its length is about 150 m., and its breadth in its widest part from 25 to 35 m. It has many branches, and is studded with towns and villages throughout its extent. The slopes of the hills and most of the level tracts are well cultivated, the fields being irrigated from a small stream which runs through it. This river, though sometimes a raging flood, is

frequently dry. In 1870 the W. part of Hadramaut was visited by Capt. S. B. Miles of the British army, in company with Werner Munzinger, the German traveller, who landed at Hisu Ghorab, about lon. 48° 30', and passed through the country between that point and Aden. The lowland about Hisu Ghorab consists of barren sand and rocks to the hills, about 10 m. inland. In the uplands anthracite is found, with bitumen in abundance and signs of copper. Dates are the chief product, and a little indigo is raised, but no coffee. No game was seen, excepting a few gazelles, but singing birds were numerous.—The coast between there and Aden is peopled by four tribes, settled in towns and villages and not nomadic, who have been independent about 100 years, having been previously subjects of the imam of Sana. The most easterly tribe, the Wahidi, occupy the greater part of the wady Maifah, in a sand and limestone region, which is very productive. They are the least aggressive of any of the tribes, and are mostly settled down as peaceful tillers of the soil. Their chief towns are Hota, with 8,000 inhabitants, and Habban, with 3,000. No coffee or cotton is cultivated, and cattle, sheep, and goats are scarce and dear. They are divided into three sections, each under the rule of a sultan, who has little more than patriarchal authority. Their founder was Abdul Wahid, a Koreish chief who conquered the territory. Next W. of them are the Deaybi, who are called by their neighbors Himyars, and claim to be the descendants of the ancient Himyarites. Their language is a dialect of the Sabæan. They occupy a portion of the wady Maifah and a part of the coast to about 50 m. inland. Each of their seven divisions is ruled by an *abu* (father). They are said to be rapacious and marauding in their habits. The Owlaki hold about 60 m. of the coast from the Deaybi to Mugatein. They have two divisions, the Owlaki Ali Nasir and the Owlaki el-Nisab, each having a sultan. The former, who number about 15,000, hold the coast; the latter the interior. Their country is well cultivated, and they own numerous flocks of sheep, goats, and camels. They are the only tribe possessing horses, of which they have a fine breed. From Mugatein to Iwad, near Aden, about 100 m., the coast is possessed by the Fudthi, a restless, warlike, and ambitious tribe, numbering about 17,000. Their country is intersected by two wadies, the Hassan and the Bunna, which are well watered. Along the sea is a thick forest of mimosas, and beyond, toward the hills, are fields of grass and corn. Ambergis is sometimes found on the coast. The agricultural products are wheat, barley, millet, sesamum, and cotton. No coffee is cultivated, but it might easily be raised with proper irrigation. Indigo is grown, but not to any extent. Myrrh trees abound, and frankincense trees are found in the Himyar hills, but the gum is scarcely known to the Arabs. The E. part of the coast,

next to Oman, is occupied by the Mahra tribe.—The principal seaport of Hadramaut is Makallah, which has a considerable trade with India and Yemen, exporting to the former vegetable products, and to the latter carpets, silk shawls, linen, and yambeas or girdle knives. The people of the coast are fond of going abroad, and many of them are seen in India and Egypt, serving as soldiers or sailors; but they usually return to their country when they have acquired a competence.—Hadramaut, in the narrower sense, constituted a part of the ancient Arabia Felix. It derived its name from the Adramitæ, an Arabian tribe, who were actively engaged in the drug, spice, and silk trade, of which their capital Sabatha was the emporium.

HADRIAN, or **Adrian** (**PUBLIUS ÆLIUS HADRIANUS**), a Roman emperor, born in Rome, Jan. 24, A. D. 76, died July 10, 138. His father, a Roman senator, married the aunt of Trajan; and when he died, Trajan, who had not yet succeeded to the empire, became one of Hadrian's guardians. The emperor Nerva adopted Trajan, and the next year died, and Hadrian travelled from upper to lower Germany, and was the first to announce the event to the new emperor. He next married Julia Sabina, granddaughter of Trajan's sister; and through this new connection, joined to the favor of the emperor's wife Plotina, he rose rapidly to various high offices at Rome, being quaestor in 101, tribune of the people in 105, prætor in 107, and *legatus prætorius* of Lower Pannonia in 108. He accompanied Trajan in most of his expeditions, and distinguished himself in the second war against the Dacians (104–106). Trajan made him his private secretary, and probably selected him as his heir. When Trajan died, Hadrian was in command of the armies of the East, and was proclaimed emperor at Antioch, Aug. 11, 117. He immediately wrote to the senate apologizing for this haste, and asking their sanction of his election, which they at once gave. Hadrian's policy was pacific. He renounced the conquests made by Trajan east of the Euphrates, concluded a treaty with the Parthians, and returned to Rome, where he celebrated a triumph in honor of his predecessor (118). Some warlike movements of the Sarmatians now drew him toward Dacia, but his progress was checked by intelligence of the discovery of a conspiracy at Rome, led by men of high rank. He directed the chief conspirators to be put to death, a severity which offended many. To recover his popularity he cancelled the arrears of taxes for the last 15 years, and assured the senate that he would never again put to death a senator without their consent. In 119 he began his tour through the Roman empire, visited Gaul and Germany, and in Britain built a rampart of earth about 60 m. long for the defence of the Roman province, extending from Solway frith to the North sea near the mouth of the Tyne. He then returned through Gaul, spent a winter in Spain,

crossed into Mauritania, visited Egypt and western Asia, and finally paused at Athens for three years, where he was initiated into the Eleusinian mysteries, and presided at the public games. In this journey he won the favor of the provincials by his liberality, and by various public works which he planned and executed for their benefit. The Jews having revolted in 131, he punished them with great severity. Judea was desolated and reduced almost to a wilderness; the Jews were expelled from Jerusalem, and were forbidden to return thither, a Roman colony being planted in their place. His health declining, he chose Titus Aurelius, afterward known as Antoninus Pius, his heir, but obliged him to adopt the son of Ælius Verus, and also M. Annus Verus, the future Marcus Aurelius. He had built a magnificent villa near Tibur, where he now passed much of his time. As death approached, his mind became affected, and he grew suspicious and cruel. He was an able and generally a wise ruler. His literary attainments were considerable; he wrote and spoke with eloquence, and left numerous works in prose and verse, all of which are lost except a few epigrams.

HADROSAURUS, a gigantic extinct dinosaurian reptile, living on the shores and in the forests of the Cretaceous epoch, abundant in the re-



Hadrosaurus.

gion of New Jersey, where its remains have been found. It attained a length of 30 ft., its femur having been found 5 ft. long, considerably longer than that of the great iguanodon of

England; the fore limbs were less than half the size of the hind, but the tail was of immense strength. It was evidently a land animal, and its grinding teeth indicate the vegetable character of its food. Its favorite attitude must have been to support itself upon the very strong hind limbs and tail, after the manner of the megatherioids, reaching to the foliage on which it fed by its smaller and freely movable anterior limbs. As the iguanodon seems to have been the prophetic type of the great pachyderms of the tertiary age, the hadrosaurus seems to point to the coming of the huge edentates like megatherium and mylodon. A fine restoration of this animal (*hadrosaurus Foulki*, Leidy) is in the museum of the academy of natural sciences at Philadelphia.

HADRUMETUM, or *Adrumetum*, an ancient city in northern Africa, on the seacoast, in the *sinus Neapolitanus* (gulf of Hammamet). It was founded by the Phœnicians, and became one of the chief ports for the corn-producing province of Byzacena, of which it was the capital under the Romans. It figured in the Punic and civil wars, was devastated by the Vandals, and was restored by Justinian under the name of Justinianopolis. Its remains are identified at the modern Susa, 70 m. S. S. E. of Tunis.

HADZIEWICZ, Rafael, a Polish painter, born at Zamek, near Lublin, in 1806. He exhibited in 1829 "Marius on the Ruins of Carthage" and "St. Stanislas," and perfected his art in Paris and in Italy. On returning to Poland he executed pictures for the cathedral of Warsaw, and became professor in that city after having held for five years a chair at the university of Moscow. He excels in religious and historical subjects.

HAECKEL, Ernst Heinrich, a German naturalist, born in Potsdam, Feb. 16, 1834. His early predilections were for botanical studies, and while still at the gymnasium he prepared for publication a *Flora Merseburgensis*. He studied anatomy and histology in Würzburg under Kölliker and Leydig, and in Berlin under Johannes Müller. Returning to Würzburg, he became the assistant of Rudolf Virchow. Having studied medicine, he settled in Berlin in 1858 as a practising physician. In 1854 and 1856 he had made with Kölliker and H. Müller scientific excursions to the Mediterranean, some of the results of which he published in 1857 in an essay on the tissues of the river crab. A 15 months' residence in Italy during 1859-'60, which he employed in zoölogical researches, finally withdrew him from the practice of medicine and made him a professed zoölogist. On March 4, 1861, he submitted to the university of Jena his thesis *De Rhizopodum Finibus et Ordinibus*; and in 1862 he was made extraordinary professor. In the same year he wrote an essay on *radiolaria* or radiary rhizopods, with an atlas of 35 plates, to which the Cothenius gold medal was awarded. This work contains not only a complete collection, systematic arrangement, and critical

examination of all the genera and species of *radiolaria* previously observed, but the names, description, and figures of 46 new genera and 144 new species, nearly three times as many as were before known. In this essay Haeckel avowed his conviction "of the mutability of species, and of the actual genealogical relationship of all organisms." Without subscribing to all the views and hypotheses of Darwin as to natural selection, he recognized the great merits of the Darwinian theory, and pointed out its logical consequences. At that time Darwinism was generally looked upon with great disfavor in German scientific circles; and when on Sept. 19, 1863, Haeckel appeared before the convention of German physicians and naturalists held in Stettin as its enthusiastic advocate, he stood almost alone. Thenceforth he determined to devote his life to the extension, establishment, and promulgation of the doctrine of evolution. By continued special investigations he has become an authority among the gatherers of facts in many departments of zoölogy. In 1864 he published, with illustrations, "Contributions to the Knowledge of Corycæide Crustacea," in the *Jenaische Zeitschrift für Medicin und Naturwissenschaft*; and in 1865 an illustrated monograph on geryonide medusæ, which had previously appeared in the same periodical. In the latter year the university of Jena created a regular chair of zoölogy especially for him, and he began to form by personal collection a museum which has since become one of the most valuable in existence for instruction, and as illustrating points of ontogeny and morphology. From that time his lectures, together with those of Gegenbaur, have made the small university of Jena unrivalled as a school for zoölogy and comparative anatomy. He has refused very advantageous appointments to other universities, mainly because he would not be separated from his friend and collaborer Gegenbaur. In 1866 he completed a work which, though eclipsed in popularity by two of his later works, the *Natürliche Schöpfungsgeschichte* and *Die Kalkschwämme*, must be considered one of the landmarks of biological science; this is the *Generelle Morphologie der Organismen* (2 vols. 8vo). Its purpose was to trace for anatomy and embryology "immutable natural law in all events and forms." The amount of positive information which this work contains is very remarkable. We are told in the preface that 20 years previously (that is, when he was only 12 years old) he had two herbariums: "the official one," containing typical forms, all carefully labelled as separate and distinct species; the other a secret one, in which were placed the "bad kinds" of *rubus*, *rosa*, *salix*, &c., presenting a long series of individuals transitional from one good species to another. These were at that time the forbidden fruits of knowledge, which in leisure hours were his secret delight. He had later in life greeted Darwin's revival of the transmutation theory with enthusiasm.

Now he could maintain that the boundary lines between different organic forms were not partitions existing in nature, but the expression on our part of the differences which result from divergent development, and which for practical reasons are defined more sharply in our apprehension than the connecting links. He endeavored to bring out the connections and transitions, and to represent them in systematic arrangement in the form of genealogical trees. He propounded as a fundamental biogenetic law that "the ontogeny of every organism repeats in brief time and in general outline its phylogeny;" *i. e.*, that the individual development of every organism, or the series of forms through which it passes from germ to completed form, repeats approximately the development of its race, or the series of forms through which its ancestors have passed. Moreover, all organic beings hitherto had been classified into the two kingdoms, animal and vegetable; but a number of creatures were found to present in external form, in internal structure, and in all vital phenomena, so remarkable a mixture or combination of distinguishing animal and vegetable characteristics, that it was impossible, except arbitrarily, to assign them to either realm; he assigned these doubtful beings to a kingdom by themselves, below and yet between the two other organic kingdoms, and this he called *protistic*. Again and again in existing forms he traced development from preëxisting ones. Many biologists, among them Prof. Huxley, have pronounced this the most important work of the kind ever published. During the winter of 1866 Haeckel made a zoölogical excursion to the Canary islands, remaining three months at Arécife, the harbor town of the island of Lanza-rote. His report of the trip, and of the marine fauna met with, appeared in the *Jenaische Zeitschrift* for September, 1867. During the following winter he delivered a series of popular lectures on the evolution doctrine in general, and the views of Kant, Lamarck, Goethe, and Darwin in particular, the stenographic report of which constitutes the basis of the *Natürliche Schöpfungsgeschichte*, which has made him known to the German reading public at large. Many editions of this book have been published, and it has been translated into several languages. Darwin says of it in the introduction to his "Descent of Man" (1871): "If this work had appeared before my essay had been written, I should probably never have completed it. Almost all the conclusions at which I have arrived I find confirmed by this naturalist, whose knowledge on many points is much fuller than mine." His *Biologische Studien, erstes Heft: Studien über Moneren und andere Protisten* (1870), is a collection of papers on moneres, "On Catallacts, a new Group of Protists," &c., previously published in the *Jenaische Zeitschrift*. In 1869 a gold medal was awarded him at Utrecht for an essay on the development of siphonophores. He spent the

months of August and September of that year on the coast of Norway, and March and April, 1871, on the Dalmatian coast, at Lesina, and in Trieste; while in 1873 he made a more extended excursion in the East. During the last three or four years he has delivered popular scientific lectures at Jena and at Berlin, of which he has published *Ueber Arbeitstheilung in Natur- und Menschenleben* (1869), *Das Leben in den grössten Meerestiefen* (1870), and *Ueber die Entstehung und den Stammbaum des Menschengeschlechts* (2d ed., 1871); and has written on various subjects for periodicals lay and scientific, and a great number of essays. But in September, 1869, appeared an article in the *Jenaische Zeitschrift*, translated for the "Annals and Magazine of Natural History," "On the Organization of Sponges and their Relationship to Corals;" this was followed by another entitled "Prodromus of a System of the Calcareous Sponges" (an artificial system), and a year later by one "On the Sexual Propagation and the Natural System of Sponges." These articles were the forerunners of the great work on calcareous sponges before mentioned, viz., *Die Kalkschwämme: Eine Monographie* (2 vols., with an atlas of 60 plates and explanations, forming vol. iii., 1872). In the investigation and accurate pictorial representation of new genera and species, and the description of the structure and functions of these comparatively unknown members of the animal kingdom, Haeckel has enriched our knowledge as much as all previous investigators together; yet this is only an incidental and secondary object of his work. Its aim is to prove the theory of descent in a way that had never before been attempted, namely, analytically, by showing the genealogical connection in a complete group of organisms of the various forms distinguished from each other as species, genera, &c. What Darwin and all others had attempted was to solve the problem of the origin of species synthetically, *i. e.*, to prove the truth of the transmutation theory by arguments from philosophy and biology, from comparative anatomy and palæontology, by considerations of the mutual affinities of organic beings, of their embryological relations, their geographical distribution, geological succession, &c. To such considerations Darwin had added the theory of natural selection. Haeckel himself, in his *Generelle Morphologie*, had applied the synthetical method to organic forms, and popularized it in his *Natürliche Schöpfungsgeschichte*. But experience had shown that the synthetical proof alone is not esteemed sufficient by all biologists. Many have asked for analytical proof; and such proof Haeckel has undertaken. He has selected the group of calcareous sponges, and has shown by thousands of examinations the gradual transitions from the most simple to the most perfect sponge form. This is the first attempt made to follow up the *bona species* into its last and darkest nook, to bring it to the light, and

to show that it is originally always a *mala species*. In the preface Haeckel says: "Every thinking and candid systematist who has made himself familiar with the natural and artificial systems in the second volume of this monograph will admit that there are here no true species in the dogmatic sense of the schools. Prove to me among the species of calcareous sponges of which numerous individuals have been examined, any *bona species* in the sense of the schools, and I will give up the whole theory of descent." From this point of view this book, though treating of so special a subject, is of universal interest. With its publication the doctrine of evolution entered upon a new phase. Haeckel's latest work is an essay on "The Gastræa Theory, the Phylogenetic Classification of the Animal Kingdom, and the Homology of the Germ Layers" (1874). The gastræa theory, to which he was led by his researches on the development of calcareous sponges, is based upon the consideration that all the six higher animal classes, from the sponges to the lowest of the vertebrates, pass through a similar stage of development, which he calls the gastrula stage; it is found that in all of them the original egg cell divides itself by the characteristic process of segmentation or furrowing into at first 2, then 4, then 8, then 16, 32, 64, &c., divisions; and the cellular mass thus formed differentiates itself into two epithelial layers, from the inner one of which the digestive canal with all its appendages is developed, while from the outer layer are formed the skin, nervous system, &c. From the fact that at one stage of their existence they all essentially consist of a primitive stomach or digestive cavity (whence the name *gastrula*), and are at that stage more or less alike, and from the homology of the primitive epithelial layers of the germ traceable in all of them, he concludes that they must have been derived from a common original form. This form, essentially corresponding to the developmental stage of gastrula, he proposes to call *gastræa*, stomach-possessor. The infusoria and still more simple animal organisms have nothing which corresponds to the gastrula stage; and he divides the animal kingdom into the two great groups *protozoa*, including animal moneres, amœba, and gregarina (which together he calls *ovularia*), and infusoria; and *metazoa*, or *gastrozoa*, the descendants of the *gastræa*, which include on the one hand the zoöphytes or cœlenterates, and on the other the worms, with the four higher classes (mollusks, echinoderms, arthropods, and vertebrates) which have sprung from worms.

HÆMOPTYSIS (Gr. *haima*, blood, and *πτῖσις*, a spitting), the spitting or raising of blood from the lungs. Hæmoptysis may be a simple exudation from the mucous membrane without appreciable lesion, or may be caused by an organic lesion of the lungs; it is most common between the ages of 16 and 35, in the female sex, and in nervous and sanguine tempera-

ments; it appears to be often hereditary, and is most apt to attack those whose professions require prolonged and forced use of the voice; other causes are violent muscular efforts, paroxysms of cough, blows or pressure on the chest, inspiration of irritating vapors or of the rarefied air on high mountains; it is also symptomatic of the suppression of various natural and morbid secretions. It may be exuded from the bronchial membranes, or may proceed from capillaries communicating with the air passages in any part of their extent; the amount varies from a drachm or two to as many pints at a time, and is florid and more or less mixed with air, differing from the dark coagulated blood which comes from the stomach. An attack of hæmoptysis is generally announced by a feeling of heat and oppression in the chest behind the sternum, followed by a cough which brings up the blood; when the quantity is very great, it pours forth without cough, with considerable spasmodic effort. The effect of profuse hæmoptysis is that of other great hæmorrhages, increased by the terror which spitting of blood always inspires. It sometimes takes the place of the suppressed menstrual or other discharges, and with the same relief to the system. Though spitting of blood sometimes occurs after the violent paroxysms of whooping cough, asthma, and chronic bronchial disease, and also in congestive affections of the lungs, it is more peculiarly the sign of tubercular phthisis or consumption, in the earlier as well as advanced stages of the disease. In making a diagnosis it is important to ascertain the source of the blood which escapes from the mouth, and if determined to be from the lungs, to decide whether it is symptomatic of disease of these organs or merely vicarious in its character. The prognosis in hæmoptysis, chiefly on account of this tubercular complication, is generally serious, although immediate danger is usually not great. The treatment consists in the application of ice to the chest, swallowing lumps of ice, and the administration of internal remedies, called hæmostatics, the mode of whose action is somewhat obscure. Among the most popular and efficient is common salt, taken dry, or with very little water. Tincture of chloride of iron or dilute sulphuric acid may be given, it is said, with benefit, and inhalation of its vapor has been found efficacious. Wunderlich recommends the exhibition of ergot in doses of from 5 to 10 grains until numbness of the fingers is produced. Narcotics may be used quite freely, tending to produce calmness. In all cases the treatment should be assisted by tranquillity of mind, rest, cool air, and looseness of dress. After the attack has ceased, astringent tonics, like iron and quinine, may be given, care being taken not to produce plethora. The return of the bleeding should be guarded against by avoiding the exciting causes, and attending to the rules of hygiene.

HÆMORRHAGE (Gr. *haima*, blood, and *ῥήγνυσις*, obs. *παγεῖν*, to burst), an escape of blood from

the vessels of the living body, called active or passive according as it is arterial or venous in character. Hæmorrhage may be natural, as in the menstrual discharge; symptomatic of disease, as in scurvy, typhoid fever, epistaxis, and hæmorrhoids; essential, inasmuch as the bleeding appears to constitute the principal disease, arising from and keeping up a degeneration of the vital fluid; and traumatic, when the blood vessels are wounded. Active hæmorrhage, when not traumatic, consists in an escape of blood from the capillaries, distended and ruptured by inflammation and excitement, as in bleeding from the mucous membrane of the lungs, nose, rectum, urethra, and from granulating wounds; this is accompanied by local heat, pain, tension, and general febrile condition. In passive hæmorrhage the blood is venous, as in chronic diseases of the liver, uterus, and rectum. There are certain persons called "bleeders," in whom a hæmorrhagic diathesis exists, a peculiar and often hereditary constitutional defect in which the blood seems to have no power of coagulation and the vessels none of contractility; in such the most trifling wounds are followed by profuse and sometimes uncontrollable and fatal bleeding. The symptoms of hæmorrhage vary according to its seat, whether external or internal, active or passive; the amount of blood lost is almost always greatly overestimated by terrified patients and bystanders. In most acute attacks there are premonitory symptoms, constituting the so-called *molimen hæmorrhagicum*, such as chills followed by heat and fulness of the vessels of the part. A small loss of blood may produce great relief in congestions and inflammations, but hæmorrhage carried beyond this point causes paleness, chilliness, cold sweats, nausea and vomiting, hurried respiration, weak and rapid pulse, dizziness, fainting, and finally convulsions and death. In severe wounds these symptoms may in a few moments end fatally; at other times the train may be prolonged for years, with a gradual sinking of the vital forces. In acute inflammations an amount of blood may be taken which would be seriously felt in a state of health. Bouillaud and his disciples of the French school applied the lancet, cups, and leeches in a way that deservedly excited the opposition of other practitioners; Lisfranc, in a case of tetanus, bled a patient from the arm 19 days in succession, and applied nearly 800 leeches along the spine. The loss to the system from profuse bleeding is very soon made up, and the sooner in proportion to the rapidity of the abstraction, in a healthy person; while the feebleness arising from frequent but inconsiderable hæmorrhages may require years for its removal. Modern practitioners generally avoid venesection except in inflammatory and congestive diseases of threatening character, as where the brain, heart, and lungs are in momentary danger; arterial sedatives (like digitalis and *veratrum viride*), and revulsives to the skin and mucous

membranes, have nearly taken the place of the lancet and the leech. Bleeding from the nose is most frequent in the young, from the lungs between the time of puberty and adult age, and from the rectum, bladder, and uterus later in life. The prognosis of hæmorrhage varies according to its origin and amount, and the constitution of the individual. While an effusion of blood into the brain or the pericardium would be very dangerous, a bleeding from the nose or from piles would be generally of little importance; blood coming from the stomach and urinary organs is a graver symptom than that from the air passages; a rapid is more dangerous than a slow loss to the same amount, and a passive than an active hæmorrhage.—The treatment of hæmorrhage, exclusive of strictly surgical means, consists, in the active forms, of general and local depletion, cold and astringent applications; the administration of digitalis and *veratrum viride* to quiet the circulation; of common salt, especially in bleeding from the lungs; of the mineral acids, chloride and sulphate of iron, vegetable astringents, as tannin, and sometimes ergot of rye; and rest and elevated position of the bleeding part when practicable. Arterial hæmorrhage may be known by the florid color, profuse quantity, and pulsating jet of the blood. Nature's processes for arresting such a flow are the contraction of the divided orifice, the retraction of the vessel into its sheath, the coagulation of the blood in and about the sheath, and the retardation of the circulation by faintness; and these will generally suffice for the wound of an artery of the size of the temporal. When art interferes, it is by pressure, torsion, the ligature, cold, styptics, and caustics; a partial is more dangerous than a complete division of an artery, as contraction and retraction are prevented, and for this reason a small vessel should be completely divided. A lacerated artery contracts almost immediately, and rarely bleeds; hence the umbilical cord of animals bitten or torn by the mother gives forth no blood, and hence the efficacy of torsion. Hæmorrhage from a vein is continuous and darker colored, and rarely dangerous, unless from a large, deep-seated, or varicose vessel; pressure, elevated position, and styptics will generally arrest it, and as a last resort the ligature. Bleeding from the nose may be either arterial or venous, and requires nothing special beyond snuffing up astringents and plugging the nostrils. In each case the treatment must depend upon the seat of the lesion, and other circumstances, which require either topical or general remedies. Whenever topical applications are admissible, they are the most efficient.—For hæmorrhage of the lungs and rectum, see HÆMOPHTYSIS, and HÆMORRHOIDS. Bleeding from the stomach is *hematemesis*, and that from the uterus *metrorrhagia*, or *menorrhagia* when connected with the menstrual discharge.

HÆMORRHOIDS (Gr. *haima*, blood, and *ptéiv*, to flow), or **Piles**, tumors situated near the

anus, generally commencing by a varicose enlargement of the hæmorrhoidal veins of the rectum, and frequently complicated with, if not arising from, erectile tumors, blood-filled cysts in the submucous areolar tissues, and dilatation of the capillary vessels. By whatever caused, the mucous membrane becomes irritated, sensitive, disposed to bleed, thickened, and more or less obstructing the rectal canal. They have been divided into internal or external piles, according to their situation within or without the anus; the former are generally within the last three inches of the rectum, of firm texture, varying in size from a pea to a walnut, pale when indolent, and dark red when congested or inflamed; the latter are found on the margin of the anus, of firmer texture, often covered half with skin and half with mucous membrane. Hæmorrhoids are also divided into open, or bleeding, and shut, or blind piles. The tumors are rarely single, generally spherical, with a large base, but occasionally pedunculate; their surface may be either smooth or irregular, rough, and ulcerated; when indolent and internal, they produce simply the inconvenience of bulk and consequent trouble in defecation; when irritated, either internal or external, they cause a sense of heat, tension, and itching, pain and straining during evacuation of the bowel, accompanied by more or less bleeding, frequent micturition, and weight and pain in the back and thighs. When external, the friction of the clothes often renders standing, sitting, or walking exceedingly painful; when just on the verge of the anus, the act of defecation is accompanied by tenesmus and excruciating pain, rendered more intense by the usually present constipation. By constant efforts, the mucous membrane becomes prolapsed, adding another source of discomfort. Hæmorrhoids, though generally a local disease, may be the channel by which a periodical flux or a constitutional plethora finds relief; in such cases the bleeding is preceded by the general and local symptoms of excess of blood. All ages and both sexes are subject to this disease, though it is comparatively rare before puberty, and females are more frequently sufferers from it than males, especially during gestation, and plethoric persons more than the anæmic. The predisposing causes are such as produce fullness of the hæmorrhoidal veins and impede the return of blood from them, such as sedentary habits, city life, constipation, pregnancy, the use of corsets, the weight of heavy garments suspended from the hips, and diseases of the thoracic and abdominal organs interfering with the circulation. The exciting causes are anything which irritates the lower portion of the intestine, as the presence of pin worms, the use of aloëtic medicines and injections, and, in warm climates especially, the use of too nourishing food, with its tendency to produce plethora, and its accompanying luxurious habits. The prognosis is generally favorable, unless the disease be of long standing,

in a debilitated constitution, or accompanied by malignant affection of the rectum; in some cases the hæmorrhoidal flux may be positively advantageous, and its sudden and complete suppression may subject the patient to more grave disease.—The general principles of treatment are, according to the evident causes, to diminish the amount of blood sent to the parts by active habits, abstemious living, avoidance of constipation, and attention to other hygienic rules. In case of irritation, leeches or cupping in the neighborhood, fomentations, poultices, enemata, refrigerant and soothing lotions, are of advantage. Strict observance of cleanliness, astringent applications like tannin ointment, pressure by bandage and pad, ice, and antiphlogistic measures will suffice in many cases. A surgical operation is often necessary for a radical cure. This consists in excision, either by knife, cautery, or ligature, usually the last. It is excessively painful, unless the patient is placed under the influence of anæsthetics.

HAFF (Dan. *Hav*, sea), a word used in connection with adjectives to designate three large lagoon-like estuaries on the S. shore of the Baltic, communicating with it by one or more narrow passages. They are all in Prussia, and are called Kurisches Haff, Frisches Haff, and Stettiner or Pommersches Haff.

HAFIZ, Mohammed Shems ed-Din, a Persian poet, born in Shiraz near the beginning of the 14th century, died about 1390. He early devoted himself to Mohammedan jurisprudence and theology, in which he became profoundly versed, and which he taught publicly. He then lived as a dervish, in luxurious pleasure, in the quarter of Shiraz called Mosella, under the dynasty of the Mosafferids, whose eulogist he was. The sultan Ahmed Ilkhani vainly invited him to his court at Bagdad. When in 1387 Tamerlane conquered Shiraz, he treated the poet with the greatest distinction. In his old age he abandoned luxury for austerities, and employed his talents in celebrating the unity of God and the praises of the prophet. This conversion did not secure him the pardon of zealous Mussulmans for his previous songs of love and wine, and they persisted in deeming him an infidel, an atheist, or a Christian, and after his death denied him the honors of sepulture. His admirers, however, maintained his orthodoxy, and, it being at length agreed to leave the decision to chance, the lot fell on a passage from his odes which avowed his faults, but at the same time affirmed that he was predestined to paradise. A magnificent tomb was then erected to his memory; it stands amid scenery described in his poems, and is still a favorite rendezvous of the young men of Shiraz, who resort thither to sing his verses and to drink wine. His only work is the *Divan*, a collection made after his death of 571 detached odes, called gazels, and seven elegies. His most licentious and passionate verses are regarded by the Persians as inspired by divine love, and are read as a devotional

exercise by pious Mussulmans; and the principal oriental commentators occupy themselves with allegorizing and spiritualizing his expressions. A Persian edition was published at Calcutta in 1791; and later eastern editions are those of Bombay (1828 and 1850), Cairo (1834), and Constantinople (1840), with the commentary of Sudi. Dr. Thomas Hyde, the first English orientalist who studied the poems of Hafiz, translated into Latin his first gazel, with the Turkish commentary of Feridun. Others of them were translated into Latin by Rzewuski and Sir William Jones. The whole *Divan* was translated into German by Von Hammer (2 vols., Tübingen, 1812-'15), and several of the gazels into English by Richardson (1774), Nott (1787), and Hindley (1800).

HAGAR, an Egyptian servant belonging to Sarah, who, being childless, gave her to her husband Abraham, that by her as a substitute she might be blessed with children. Her descendants are called in the Bible Hagarites or Hagarenes, from herself, and Ishmaelites, from her son Ishmael. The Arabs, who claim descent from her son, regard her with veneration, and speak of her as Abraham's lawful wife.

HAGEN, a town of Prussia, in the province of Westphalia, on the Volme and Empe, and on the Dortmund and Düsseldorf railway, 24 m. W. of Arnsberg; pop. in 1871, 13,445. It has two Catholic churches, a Protestant church, a synagogue, a chamber of commerce, and a trade school. Iron and steel ware, tobacco, paper, and cloth are manufactured. There are also wire-drawing and copper-rolling works.

HAGEN, **Ernst August**, a German author, born in Königsberg, April 12, 1797. While at the university of his native city he wrote a romance, *Olfrid und Lisenä* (1820). In 1821 he visited Rome, and in 1824 lectured at Königsberg on the history of art and literature; and in 1825 he was appointed professor in this department. As founder of the Prussian antiquarian society at Königsberg, he edited (1846-'57) the *Neue preussische Provinzialblätter*. He published the art histories, *Norica* (Breslau, 1827; English translation, London, 1851), *Die Chronik seiner Vaterstadt vom Florentiner Ghiberti* (Leipsic, 1833), and *Wunder der heiligen Katharina von Siena*, and *Leonardo da Vinci in Mailand* (1840). Among his other works are *Die deutsche Kunst in unserm Jahrhundert* (1857), and *Acht Jahre aus dem Leben Michel Angelo Buonarrotti's* (1864).

HAGENAU (Fr. *Hagenau*), a city of Germany, in Alsace, on the Moder, in the midst of a large forest called the Hagenauer Wald, 16 m. N. by E. of Strasburg; pop. in 1871, 11,331. It is surrounded by ancient walls flanked with towers. There are five churches, of which that of St. Nicholas was built in the 13th century and St. George's in the 12th, a communal college, manufactories of woollen and cotton, tanneries, breweries, and hemp mills, and a considerable trade in timber, wool, madder, and hops. It was founded about the middle

of the 12th century, and fortified by the emperor Frederick I. In 1423 it was pawned by the emperor Sigismund to the elector palatine, but was redeemed by Ferdinand I. in 1558, and afterward belonged to the house of Hapsburg, until by the peace of Westphalia (1648) it came to France. There were bloody encounters near Hagenau, between the French and Austrians, Oct. 17 and Dec. 22, 1793; but it was retained by the French until the war of 1870 gave Alsace to Germany.

HAGENBACH, **Karl Rudolf**, a German historian, born in Basel, March 4, 1801, died there, June 7, 1874. He studied at Basel, Bonn, and Berlin, adopted the views of Schleiermacher, and in 1828 became professor of theology at Basel. He resigned his professorship shortly before his death. Among his works are: *Tabellarische Uebersicht der Dogmengeschichte* (1828); *Encyclopädie und Methodologie der theologischen Wissenschaften* (1833; 7th ed., 1864); *Vorlesungen über Wesen und Geschichte der Reformation* (6 vols., 1834-'43; 2d ed., 1851-'6); *Kirchengeschichte des 18. und 19. Jahrhunderts* (2 vols., 2d ed., 1848-'9; English translation, "History of the Church in the Eighteenth and Nineteenth Centuries," London, 1869); *Lehrbuch der Dogmengeschichte* (2 vols., 1840-'41; 4th ed., 1857; English translation, "History of Doctrines," 3d ed., Edinburgh, 1858); *Geschichte der theologischen Schule Basels* (1860); *Grundlinien der Homiletik und Liturgik* (1863); and *Vorlesungen über die Kirchengeschichte von der ältesten Zeit bis zum 19. Jahrhundert* (new and revised complete ed., 1868-'72). He has also published a poem, *Luther und seine Zeit* (1838), and *Gedichte* (1846; 2d ed., 1863); and since 1845 he has edited the *Kirchenblatt für die reformirte Schweiz*.

HAGERSTOWN, a city and the capital of Washington co., Maryland, on the W. bank of Antietam creek, 22 m. above its entrance into the Potomac, and at the intersection of the Cumberland Valley and Western Maryland railroads with the Washington County branch of the Baltimore and Ohio line, 60 m. W. N. W. of Baltimore; pop. in 1860, 4,132; in 1870, 5,779, of whom 869 were colored. It has broad streets, is built mostly of brick and stone, and contains a handsome court house, recently erected at a cost of \$77,000. It is surrounded by a rich agricultural region, and has considerable trade. There are two iron foundries, a manufactory of agricultural implements, an extensive flour mill, two sash and door factories, an extensive bone mill, a tannery, and a national and a state bank, with an aggregate capital of \$250,000. About 7 m. S. of Hagerstown is the college of St. James, an Episcopal institution. The city, besides several public schools, contains a female seminary, an academy for boys, a daily, a semi-weekly, and three weekly newspapers, and 12 churches, of which two are for colored people.

HAG FISH. See MYXINIDS.

HAGGAI, the tenth of the minor prophets, and first of those who prophesied after the captivity, supposed to have been born at Babylon, and to have come back from there with Zerubbabel, although one expression (ii. 3) has been thought to imply that he had seen the first temple. Nothing is known as to his death, though Epiphanius tells us he was buried at Jerusalem among the priests; if so, he must have been of the family of Aaron. He is mentioned in the Apocrypha as Aggeus. The prophecy of Haggai was delivered about 520 B. C., after the return of the Jews to their own land. It is chiefly occupied with keen reproofs and affecting exhortations respecting the building of the second temple.

HAGIOGRAPHIA (Gr. *ἅγιος*, sacred, and *γράφειν*, to write), or **Holy Writings** (in Hebrew, *Ketubim*, writings), the name given by the Jews to their third division of the Old Testament Scriptures. There are various suppositions concerning the earliest arrangement of this division by the Jews, founded on contradictory statements in Josephus, Philo, Jerome, the Talmud, &c., including a passage of Luke (xxiv. 44): "the things written in the law of Moses, and in the prophets, and in the psalms." According to the arrangement now general among the Jews, the Hagiographa includes three divisions: 1, the Psalms, Proverbs, and Job; 2, the Song of Songs, Ruth, Lamentations, Ecclesiastes, and Esther; 3, Daniel, Ezra, Nehemiah, and the Chronicles. These books probably received the name of "Hagio-grapha," or "Holy Writings," because, though not written by Moses, or any of the prophets, strictly so called, they were nevertheless regarded as inspired.

HAGUE, The (Dutch, *'s Gravenhage*; Fr. *La Haye*; Ger. *Der Haag*), a city of the Netherlands, capital of the province of South Holland, about 2 m. from the sea, 81 m. S. W. of Amsterdam and 12 m. N. N. W. of Rotterdam; pop. in 1872, 92,785, of whom one third are Roman Catholics. It is the seat of the court, the government, the states general or parliament, and of the foreign ministers, and has become since 1850 one of the finest cities in Europe, owing to the erection of stately houses and the laying out of fine parks. The streets are regular and spacious, and many of them are traversed by canals and lined with trees. The most conspicuous buildings are the royal palace and the palace of the prince of Orange;

and in the outskirts of the city is the *Huis ten Bosch* (the house in the wood), a private palace of the queen of Holland. The *Binnenhof*, so called because it formed the inner court of the count's palace, contains the chambers of the states general and other public offices, and its Gothic hall is celebrated. Barneveldt was executed in this building. Among other notable edifices are: the state prison in which Cornelius de Witt was confined, and from which he and his brother John were dragged and torn to pieces by the populace; the town hall; three Calvinistic, a French Reformed, English Presbyterian, Evangelical Lutheran, Remonstrant, and five Roman Catholic churches, two synagogues, and a fine theatre. The royal library contains about 100,000 volumes. The principal artistic attraction of the Hague is the picture gallery and museum, situated in the building called the *Maurits Huis* after Maurice of Nassau, by whom it was built; it



The Maurits Huis.

contains some of the best works of the Dutch masters. The museum abounds with rarities from China and Japan, and contains a large collection of Japan ware and Japanese weapons, and many historical relics. The Hague possesses many educational, charitable, artistic, scientific, and religious institutions. There is a brass foundry, but little trade and industry. Within a few miles of the city is the fashionable watering place Scheveningen, and the environs are dotted with elegant villas.—The Hague owes its origin to a hunting seat built by the count of Holland in the 13th century, and the name is traced to the enclosure (*hage* or hedge) which surrounded the counts' (*graven*) park. In the 16th century it became the residence of the states general, the stadtholder, and the foreign ambassadors; and it acquired, especially in the 17th century, great historical interest as the most important focus of European diplomacy. A convention was held here

March 31, 1710, in which Germany, Russia, Prussia, and the maritime powers took part for maintaining the neutrality of North Germany against France. A triple alliance between France, England, and the Netherlands was concluded here Jan. 4, 1717, and on Feb. 17 a treaty of peace between Spain, Savoy, and Austria. Yet the Hague was never mentioned in all these great transactions excepting as a village, and it was certainly the most extensive and remarkable village that ever existed. The revolution of 1795 gave a great shock to the prosperity of the place, and a final blow was given to it by King Louis Bonaparte in removing the seat of government to Amsterdam and of the law courts to Utrecht. Since the restoration in 1813-'14 of the house of Orange, the Hague has rapidly recovered its former prestige, especially as it once more became the virtual capital of the nation, although Amsterdam remains the nominal capital, and retains as such various prerogatives.

HAGUE, William, an American clergyman, born in New York about 1805. He graduated at Hamilton college in 1826, was ordained to the ministry, and has been pastor of Baptist churches in Providence, Boston, Newark, Albany, New York, Chicago, and Orange, N. J. Besides many occasional addresses and minor works, he has published "The Baptist Church Transplanted from the Old World to the New" (New York, 1846); "Christianity and Statesmanship" (1855); and "Home Life," a series of lectures on family duties and relations (1855).

HAHN, August, a German theologian, born near Eisleben, March 27, 1792, died in Breslau, May 13, 1863. He was educated at Eisleben, Leipsic, and Wittenberg, in 1819 was appointed extraordinary professor of theology at Königsberg, and gained distinction by his writings on Bardesanes, Marcion, and Ephraem. In 1827 he was called to the ordinary professorship of theology at Leipsic, and published *De Rationalismi, qui dicitur, Vera Indole, et qua cum Naturalismo contineatur Ratione*. He regarded a supernatural revelation as the necessary foundation of religion. In his treatise entitled *Offene Erklärung an die evangelische Kirche zunächst in Sachsen und Preussen* (1827) he maintained that the rationalists ought in conscience voluntarily to leave the evangelical church. In 1833 he was called as consistorial counsellor and ordinary professor to Breslau, and in 1844 he was made general superintendent for Silesia. He also published *Lehrbuch des christlichen Glaubens* (1828; 2d ed., 1858), and an edition of the Hebrew Bible (1831).

HAHN-HAHN, Ida Marie Luise Sophie Friederike Gustave, countess, a German authoress, born at Tressow, Mecklenburg-Schwerin, June 22, 1805. Her father, Count Karl Friedrich von Hahn-Neubaus (born 1782), was a theatrical enthusiast, who, after devoting his whole life and fortune to the stage, was compelled in his old age to support himself by managing a provincial company, and died in poverty at Altona,

May 21, 1857. At the age of 21 she was married to her cousin, Count Friedrich Wilhelm Adolf von Hahn-Hahn, from whom she was divorced in 1829. Between 1835 and 1837 she published three volumes of verse, followed by a series of novels, such as *Gräfin Faustine*, *Ulrich*, *Sigismund Forster*, and *Cecil*. In 1839 she submitted to a dangerous operation on the eye, which for a time threatened to deprive her of sight; and to divert her mind she went to the East, recording her adventures in the *Orientalische Briefe* (3 vols., 1844). In 1850 she embraced the Roman Catholic faith, giving an account of her conversion in *Von Babylon nach Jerusalem* (1851). In 1852, wearied with the world, she entered the mother house of the order of the Good Shepherd at Angers. She afterward took up her residence at Mentz, where she devoted herself to the reformation of outcasts of her own sex, and wrote several works, among which are: *Bilder aus der Geschichte der Kirche* (3 vols., 1856-'64); *Peregrina* (1864); and *Eudoxia* (1868).

HAHNEL, Ernst Julius, a German sculptor, born in Dresden, March 9, 1811. He studied architecture under Rietschel in Dresden, and under Schwanthaler in Munich, and sculpture at Rome and Florence. In 1835 he went to Munich, and in 1848 became professor at the academy of Dresden. In 1855 he was invited to the academy of Vienna, where he was a successful teacher. Among his best works are a statue of Beethoven at Rome, and a Madonna. The bass-reliefs in the new museum at Dresden are also his work. These were followed by the "Four Evangelists," and the "Three Holy Kings," of colossal size, for the tower at Neustadt-Dresden (1858), and the tomb of King Frederick Augustus II. of Saxony (1866).

HAHNEMANN, Samuel Christian Friedrich, the founder of the homœopathic system of medicine, born in Meissen, Saxony, April 10, 1755, died in Paris, July 2, 1843. He was educated at the high school of his native town, and at the age of 20 went to Leipsic to study medicine. Here he devoted his leisure to teaching languages, and to translating foreign medical authors into German, and was accustomed to sleep only every other night, a habit he persevered in for several years. In 1777 he went to Vienna, where he came under the notice of Quarin, physician to Joseph II. and chief physician to the hospital of the Leopoldstadt, who intrusted him with the care of one of the hospital wards, and subsequently recommended him to Baron von Brückenthal, the governor of Transylvania, in whose family at Hermannstadt he remained as librarian and physician for nearly two years. In August, 1779, he took his degree of M. D. at Erlangen. After a brief residence in Hettstädt and Dessau, where he studied chemistry and mineralogy, and at Gommern near Magdeburg, where in 1785 he was married, he settled in 1787 in Dresden. Here he was rapidly acquiring reputation as a physician and writer on medical

science, when a distrust of the received system of therapeutics caused him to pause in his labors. In place of facts and laws, he complained that he found only hypotheses and theories. Finding that he could no longer conscientiously practise his profession, he returned in 1789 to Leipsic, where he resumed his chemical studies, and endeavored to support his family by translating English and French medical authors. At first he was obliged to struggle with poverty, and his children experiencing severe attacks of illness, he could only prescribe for them according to a system in which he had ceased to place confidence. This stimulated his desire to establish a new system of therapeutics. In 1790, while engaged upon a translation of Cullen's "*Materia Medica*," he was struck with the contradictory properties ascribed to Peruvian bark, and the various explanations given of its operation in intermittent fever. He resolved to try upon himself the effects of the medicine, and, after several powerful doses, discovered symptoms analogous to those of intermittent fever. The fact that a drug had produced upon a man in health the very symptoms which it was required to cure in a sick man immediately suggested to him the law, *Similia similibus curantur* ("Like cures like"), which is the groundwork of the homœopathic system. He determined to test the principle fully before announcing it to the world, and experimented upon himself with a variety of drugs. Similar results having been obtained in every instance, and also in experiments tried upon others, he applied the new law to the treatment of the patients in the insane asylum at Georgenthal near Gotha, over which the duke of Saxe-Gotha had appointed him, with complete success. From Georgenthal he proceeded to Pyrmont, Brunswick, and Königsutter, effecting in each place remarkable cures. In 1796, in a paper published in Hufeland's *Journal der praktischen Heilkunde*, he made his first public exposition of the *similia similibus* principle, which, if not its discoverer, he was the first to declare to be the leading principle in therapeutics. His suggestions were received with indifference or ridicule, and during the next 15 years he was the object of ceaseless attacks from those whose interests were opposed to the innovations he sought to introduce into medical practice. During this period he published several works, all treating of the new theory; among which was *Fragmenta de Viribus Medicamentorum Positivis sive Obvis in Corpore Sano* (2 vols., Leipsic, 1805). But in his *Organon der rationalen Heilkunde* (Dresden, 1810) homœopathy first received its distinctive name, and was first reduced to a system and methodically illustrated. This work created much sensation in Germany, and a bitter warfare was waged for upward of 12 years between the old and new schools of therapeutics. About this time he fixed his residence in Leipsic, where he entered upon an extensive practice, and gathered

about him many friends and disciples. During the prevalence of a malignant form of typhus in 1813, caused by the recent presence of the allied and French armies, the patients became so numerous that it was necessary to divide them among the physicians of the city. Of the 73 allotted to Hahnemann, and treated on the homœopathic method, all recovered except one old man. But this only increased the enmity of his opponents, and an old law was revived which prohibited a physician from dispensing his own medicines, a practice Hahnemann had always followed, and was unwilling to relinquish. He therefore in 1820 removed to Köthen, where for a time he encountered the same hostility which had driven him from Leipsic. But the homœopathic system was meanwhile making its way silently over Europe, and patients repaired from all sides to receive the advice of its founder. The importance which the petty town of Köthen thus acquired soon caused a reaction in his favor, and when, upon his marriage for a second time in 1835 with Mlle. d'Hervilly, a young French woman, he took his departure, it was deemed necessary to go secretly by night for fear the populace might insist upon detaining him. Repairing with his wife to Paris, he resided there in the active practice of his profession until his death. A statue of Hahnemann was erected in Leipsic in 1851 by the homœopathic physicians of Germany, and another in Berlin in 1855. Besides those already mentioned, his principal works are: *Reine Arzneimittellehre* (6 vols., Dresden, 1811-'20; 3d ed., 1830-'33); *Die chronischen Krankheiten* (4 vols., Dresden, 1828-'30; 2d ed., 1835-'39); and *Heilung der asiatischen Cholera* (Nuremberg, 1831). A collection of his minor works has been published (2 vols., Dresden, 1829-'34). Several of his works have been translated into English and other languages. (See HOMŒOPATHY.)

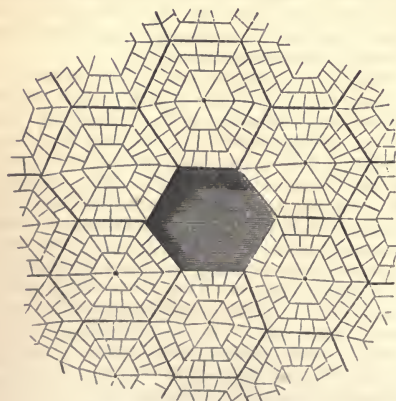
HAIL, the aqueous vapor of the atmosphere congealed in icy masses, called hailstones, and precipitated upon the earth. Hailstones vary in size and internal structure, from the homogeneous masses one eighth of an inch in diameter forming sleet, to the larger masses 3 in. in diameter, of beautiful crystalline structure, and to the still larger accretions of these masses sometimes a foot or more in diameter. The crystalline structure of most hailstones is remarkably distinct. The centre of the hail is a collection of semi-translucent granules or a spongy mass of snow and opaque ice; surrounding this nucleus is a more or less well defined radiated structure of crystals of ice; a large quantity of air is always enclosed within the interstices of the hailstone. Occasionally the stones are composed of concentric rings of ice and snow; when they consist of clear ice without the snowy nucleus, there is almost invariably found in the centre, in place of the nucleus, a cavity filled with condensed air; from experiments made in 1871 it has been shown that this bubble of enclosed air is sub-

jected to a pressure of many atmospheres. Small bits of dust, leaves, and other foreign particles are occasionally found in the interior of the mass of a hailstone, and crystals of sulphur as well as ashes are particularly observed when the hail storm occurs in a volcanic region.



Different Forms of Hail.

The small hailstones that fall in storms of sleet are generally regarded as drops of water that have been frozen in their downward passage through layers of cold air; and their formation is therefore believed to be a different process from that attending the formation of larger hailstones. These latter occur in connection



Section of Hailstone, magnified.

with a class of storms that are distinctively known as hail storms.—The velocity with which large hailstones fall to the ground is often so great that, taken in connection with their mass, they cause very serious devastation; instances are recorded of animals being destroyed in large

numbers, and damage is frequently done to houses, forests, and crops. It is believed that the velocity is indeed usually much less than is due to bodies of their size and density, and several theories have been devised to account for this. Prof. Olmsted supposed that the true reason is found in the retardation occasioned by the nucleus continually taking up in its descent accessions of vapor, which immediately before was in a state of rest; it has however not yet been shown that there is any necessity for such an explanation, since we know too little concerning the altitude above the earth's surface, at which hail is formed. Hail storms occur most frequently in the spring and summer months, and in the warmest part of the day. Kaemtz has shown that in Germany and Switzerland 50 per cent. of these storms occur in the springtime. Weselowski shows that in Russia 40 per cent. occur in summer, and 30 per cent. in spring. In the Netherlands and France 40 per cent. occur in spring. It is comparatively rare that hail storms take place between 9 P. M. and 7 A. M.; 60 per cent. of the storms in Germany occur between noon and 6 P. M. As regards the frequency of hail storms in various portions of the globe, it is generally believed that they rarely or never occur in the polar regions, and but little more frequently in those portions of the tropical regions whose climate is controlled by the neighboring ocean; thus they are recorded as of extreme rarity in the islands of Martinique, Mauritius, and in the lowlands of Java and Borneo. On the other hand, in the higher portions of Java, Borneo, and Santo Domingo, hail is by no means infrequent; in the island of Cuba, according to Poe, over 40 hail storms have been recorded since 1784. In the temperate zone, both in rolling and mountainous countries, hail storms are far more frequent. Of these countries, some, such as France, are peculiarly subject to severe hail storms, while again in every such land many localities are pointed out where it never hails. In general these latter localities are found to be decidedly higher than the average elevation of the surrounding country, or else decidedly lower; thus, according to Savigne, a mountain in the neighborhood of Clermont was during 23 years only once visited by hail, while the country about its neighborhood was frequently devastated. In Lithuania hail occurs on the hills more frequently than on the plains, while in Poland it occurs at the foot of the Carpathian mountains more frequently than in the lowlands. Leopold von Buch states that it never hails in regions where cretins are found; a generalization, however, that does not seem to be accepted by many, and the cause of which must, if the fact be granted, be looked for in some peculiarity common to the regions in question.—Among the special phenomena of hail storms may be mentioned the pauses that occur between successive falls of hail, which are well described by Kaemtz as observed by

him. He says that at the beginning of the severest storm that he ever witnessed, there fell some large drops of rain; these soon ceased, and after a short interval there fell hailstones, shaped like beans, of one or two tenths of an inch in diameter; this ceased, and there followed rain, and after another pause fresh hail of two or three tenths of an inch diameter; again another pause, and a new fall of hail. Of these successive falls of hailstones, the first possessed only a slight coating of ice over the snowy nucleus; the second class were partially surrounded with a thicker layer of ice; and the last hailstones were generally rounded masses one third of an inch in diameter. In all cases he found the kernel not transparent, while the surrounding ice was so in a high degree. Another very general peculiarity of hail storms consists in the fact that the central portion of the region passed over by the storm is almost entirely free from the fall of hailstones, which on the other hand are almost invariably found in two or more belts parallel to the track of the storm centre, and some distance therefrom. Thus in the storm of July 13, 1788, which passed from France in a northeasterly direction into Holland, the storm track was about 500 m. in length, and was traversed in less than nine hours; over the central track, to a breadth of 6 m. on either side, no hail fell, but heavy rain; on either side of this region, to a distance of 5 or 10 m., the country was visited with hail of the most destructive kind, by which property valued at more than \$5,000,000 was destroyed; rain also fell over a district stretching far beyond the belts of hail.—Perhaps the most frequent accompaniment of hail, and the most prominent peculiarity of the hail storm, is found in the discharges of electricity, which are usually but not always remarkably severe. While numerous thunder storms occur without attending hail, it is on the other hand generally the case that hail storms are also thunder storms. Ordinary thunder storms of a moderate degree of severity, as well as tornadoes, waterspouts, sand or dust storms, whirlwinds, and hail storms, have many points of similarity, and may be said to pass by insensible shadings from one to the other. Peltier enumerates 116 tornadoes or *trombes*, of which 14 were accompanied by hail. Reye, in his work on *Wirbelstürme*, enumerates 33 tornadoes that occurred in America, of which only three are noted as having been accompanied by hail. Hail storms, and indeed all that class of disturbances just enumerated, have a local character, and it is believed that in general their paths are related to the larger areas of low barometer that move over the surface of the earth; they are more numerous and more intense at those times when the barometric pressure is diminishing in advance of some extensive region of low pressure; they may in fact be said to be the precursors of, or to initiate, some more general atmospheric distur-

ance.—Our knowledge of the operations going on in the interior of a hail storm has been materially increased of late years, though still far from being complete; and the theories of Volta, Olmsted, &c., may be said to possess now only a historical interest. According to Volta, atmospheric electricity plays a very important part in the formation of hail, the snowy nucleus being alternately attracted and repelled by two layers of clouds charged by opposite electricities, and in the mean time continually adding to its size, until its weight brings it down to the earth. This theory may be regarded as distinct from the earlier electrical theories of Musschenbroek, Monge, &c.; and notwithstanding its many defects, it seems to have been very widely accepted, especially in France and Germany, during the latter part of the 18th century. Montbeillard was led in 1776 by its consideration to propose the use of Franklin's lightning rod as a protection against hail storms; a proposition that has been very widely adopted in France, but it is believed without producing the desired effect, although a popular and almost superstitious belief prevails in that country in regard to its efficiency. Leopold von Buch maintained that the water was frozen by very rapid evaporation from the surface of each drop; a hypothesis concerning which Kaemtz remarks that even if it were possible thus to convert rain drops into hailstones, this method of formation would not accord with the ordinary saturated condition of the atmosphere in the cloud region. The hypothesis that uprising currents of moist warm air, by their mixture with higher currents of very cold dry air, thereby give rise to the formation of hailstones, seems to have been first propounded by Muncke, and has, in a more or less modified form, been favored and even adopted by prominent meteorologists in Europe, and has been developed independently by Olmsted in America. More recent writers, as Peslin (1866) and Reye (1864 and 1872), have developed the consequences of the principle first announced in meteorology by Espy, that storms (including in that term every phase of atmospheric disturbance) owe their energy to the condensation of aqueous vapor caused by the cooling consequent on the internal work performed in the ascension of moist air to elevated regions of the atmosphere. It is demonstrated by these writers that the rapid ascent of the moist air found near the surface of the ground on a warm summer's day is attended with such a rapid cooling that a portion of the vapor must necessarily be condensed, either as drops of water or flakes of snow and crystals of ice. According to Reye, who in this respect is but a disciple of Espy, the phenomena of cyclones and hurricanes, of waterspouts and whirlwinds, of thunder storms and hail storms, can all be developed as the consequences of a single simple law of the mechanical theory of heat, namely, the condensation

of atmospheric aqueous vapor contained in uprising currents of air.

HAILES, Lord. See DALRYMPLE, Sir DAVID.

HAINAN, an island of China, in the China sea, between lat. 18° and 20° N., and lon. 108° and 111° E.; area, about 12,000 sq. m.; pop. about 1,500,000 Chinese, besides the tribes in the interior. It forms part of the province of Kwangtung, and lies off the peninsula of Lienchow, from which it is separated by the strait of Hainan, 15 m. broad and of difficult navigation. The E. coast is steep and rocky; the N. W. coast is unapproachable because of sand banks; but the S. coast is indented with several commodious and safe harbors. The interior of the island is mountainous and barren, but the low lands near the sea are fertile and well cultivated. The principal productions are rice, sweet potatoes, sugar, tobacco, fruits, medicinal plants, sandal wood, braziletto, ebony, dye woods, and wax, the last obtained from the *pehlah-chung* or white wax insect. There are valuable fisheries, and great quantities of dried and salted fish are shipped to Canton. The inhabitants of the maritime districts are mostly the descendants of Chinese settlers, but the interior is occupied by a distinct race, called Li, who claim to be independent of the Chinese government, and are supposed to be aborigines. These people are described as inoffensive and industrious. Hainan is divided into 13 districts. Kienchow, the residence of the governor and the capital of the whole island, on the N. coast, has a population estimated at 200,000.

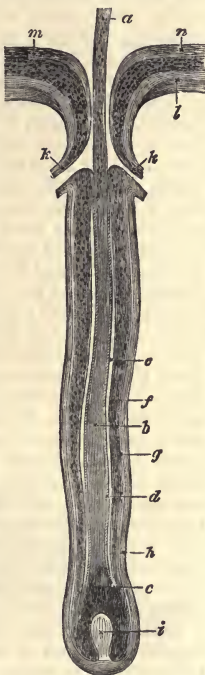
HAINAU, a town of Prussia, in the province of Silesia, on the Deichsel, and on the railway from Frankfurt-on-the-Oder to Breslau, 11 m. W. N. W. of Liegnitz; pop. about 4,500. It has manufactories of woollen and linen cloth, tile works, a shoe manufactory, and a market for horses. Here the Prussian cavalry defeated the French vanguard, May 26, 1813.

HAINAUT, or **Hainaut** (Flem. *Henegouwen*; Ger. *Hennegau*), a province of Belgium, bordering on France and the provinces of West and East Flanders, Brabant, and Namur; area, 1,437 sq. m.; pop. in 1871, 896,285. It is traversed by the rivers Sambre, Scheldt, Dender, and Haine (from which last the province received its name), and several canals. It is very hilly in the southeast, but in other parts generally level. The soil, except in the district of Charleroi, is fertile. The mineral productions are coal, iron, lead, slates, marble, building stones, and limestone. The number of persons employed in the coal mines at the end of 1870 was 68,831, and the production amounted to 10,196,530 tons. The chief crops are wheat, barley, oats, rye, flax, beans, hemp, hops, potatoes, tobacco, and chiccory. Horned cattle, sheep, and horses are reared, the latter valued as draught animals. There is also abundance of poultry, game, and bees. Hardware, glass, woollen and linen goods, porcelain, pottery, bricks, lace, and Brussels carpets are the principal manufactures. The most important ex-

ports are coal, iron, and lime. The province is traversed by good roads and railways, the great lines being the Brussels and Namur and the Brussels and Valenciennes. The principal towns are Mons, the capital, Tournay, Ath, Soignies, Charleroi, and Thuin.—The territory of Hainaut was known in ancient times as *Hanagadensis Comitatus* and *Hannonia*. Among the earliest inhabitants were the warlike Nervii. It was not called Hainaut until the 7th century, and it was long governed by local counts. It passed through many vicissitudes from the 10th to the 15th century, and, after having successively been united with Flanders and Burgundy, in 1477 came into the possession of the house of Hapsburg, and was ruled by the Spanish branch of that line from 1555 to 1713, and subsequently by the Austrian branch, with the exception of S. Hainaut, which in 1659 became part of France by the treaty of the Pyrenees. In 1793 the French annexed Austrian Hainaut, and formed of it the department of Jemmapes. In 1815 other districts were added to it, and it formed a part of the kingdom of the Netherlands until the establishment of the kingdom of Belgium in 1830.

HAIR, an elongated, more or less cylindrical epidermic appendage, analogous to the feathers of birds and the scales of reptiles. Its essential structure consists of an assemblage of epidermic cells at the bottom of a flask-shaped follicle in the substance of the skin, supplied with blood by vessels distributed to its walls; it is made up of a root, from which the hair is developed, and a stem or shaft continuous with it. The root exhibits a bulbous enlargement, which, with the lower part of the stem, is enclosed in an invagination of the epidermis, having an outer or cellular and an inner or fibrous layer, formed of granular cells; each hair follicle is implanted in a depression in the dermis, between whose epidermic lining and the stem is a space into which the canals of sebaceous follicles frequently open, and in which entozoa are often developed; the inspissated sebaceous secretion forms the scurf at the roots of the hair; the follicle penetrates sometimes $\frac{1}{2}$ of an inch, reaching on the head, face, and pubis the subcutaneous areolar tissue, but generally is imbedded in the substance of the true skin. The bottom of the follicle is occupied by a papilla upon which the hair rests, a compound cellular vesicle, the true germ of the hair. The stem is composed of a cortical investing horny layer of scales, arranged in an imbricated manner, a softer medullary or pith-like substance in the centre, and a fibrous intermediate portion constituting two thirds of the bulk of the hair; the last two are by Carpenter considered as forming together the medullary substance. The growth of hair takes place at the root by the development of new cells at the bulb, the old being pressed forward by the new or becoming elongated in the stem. Hairs are very rarely cylindrical, but generally elliptical and flattened in proportion to the curl or crispness;

the size is greatest toward the lower third, the root being smaller and the end terminating in a point. The hairs of the head are the longest, those of the beard the thickest, and those of the general surface the finest; among women the hair of the head has been known to fall below the feet, and the beard of man occasionally reaches to the waist; frequent cutting and shaving of hairs increase their thickness, but not necessarily their number. Hairs are observed in the fetus as early as the third or fourth month, in the order of follicle, bulb, and hair. From the resemblance of the mucous membranes to the skin, it is not surprising that hairs are sometimes developed on the conjunctiva of the eye, in the intestines, ovaries, &c.; they are frequently found in encysted tumors and in other inversions of epidermic structure. Hairs may be transplanted, and will contract organic adhesion in the new tissues; according to Eble, a hair which has reached its full development becomes contracted just above the bulb and falls off. In vigorous health the hairs are thick and firmly set in the skin; in debilitated persons they fall out spontaneously or with very slight force; in the latter case the bulb generally alone comes away, the sheath and germ remaining behind, and capable of reproducing the hairs under proper treatment or favorable circumstances; even when the entire follicles are removed, it is possible that new ones with their germs may be formed; new shafts are constantly in process of formation, as is shown by the short and pointed hairs on the scalp of old persons. The nutrition of hairs is effected through vessels in close contact with their tissue, without entering into their structure; so that causes affecting the general health, and especially the condition of the skin, act powerfully upon the nutrition of the hair; the premature baldness and grayness of the Americans as a people is in great measure



A Hair in its Hair Sac.

a, shaft of hair above the skin; *b*, cortical substance of the shaft, the medulla not being visible; *c*, newest portion of hair growing on the papilla (*i*); *d*, cuticle of hair; *e*, cavity of hair sac; *f*, epidermis (and root sheaths) of the hair sac corresponding to that of the integument (*m*); *g*, division between dermis and epidermis; *h*, dermis of hair sac corresponding to dermis of integument (*l*); *k*, mouths of sebaceous glands; *n*, horny epidermis of integument.

owing to the non-observance of hygienic rules, and to excess of mental and physical labor in a climate foreign to the race. Hairs are distributed over the entire surface of the human body except the palms, soles, and terminal joints of the fingers and toes; but for special purposes most abundantly on the scalp, brows, edge of the lids, pubis, chin, cheeks, armpits, chest, and entrance of the nose and ears. In these situations the number varies according to temperament, age, health, and sex. According to Withof, the quarter of a square inch contains 293 hairs on the head, 39 on the chin, 23 on the forearm, 19 on the back of the hand, and 13 on the front of the thigh; in the same extent he counted 147 black, 162 brown, and 182 flaxen hairs, showing the comparative fineness. Long and strong hairs are often found growing from moles and nævi in various parts of the body. The hair generally grows in an oblique direction on account of the way in which the follicles are placed; these are sometimes placed wrongly on the scalp, causing much trouble to anxious mothers; perseverance will generally bring the refractory locks into the desired direction. From contraction or corrugation of the skin from cold, fear, or other causes, the hair, especially on the head, becomes partially erect, though it can never stand on end "like quills upon the fretful porcupine."—The color of the hair depends partly on the presence of pigment granules, and partly on the existence of numerous minute air spaces which cause it to appear dark by transmitted light; its intensity generally bears a close relation to the color of the iris and the skin; in albinos and in gray-haired persons the coloring matter is deficient or absent. Long contact with chlorine decolorizes hair; and the undoubted fact that hair may turn white in a short time under the influence of strong emotions is doubtless to be explained by some chemical action upon the oily coloring matter, as suggested by Dr. D. F. Weindland, and more fully explained in the article FEATHERS. The turning gray of the hair is no sign of its loss of vitality, as hair of this color often grows for years as vigorously as the darker hued. Hair is remarkable for strength, elasticity, and durability, the first depending on its fibrous structure and the last two on its horny nature; a single hair will bear a strain of 1,150 grains. Hairs will endure not only during a long life, but will grow after death, and last for centuries. It is well known that hairs, especially of cats and other animals, become electrical by rubbing; the hygroscopic property of hair has been painfully manifested to many a beau and belle whose rebellious locks have refused to retain their artistic curl on the sudden occurrence of a moist atmosphere. Nitrate of silver blackens hair, forming a sulphuret, and this substance and sulphur form the bases of most of the popular hair dyes. When burned, hair emits a disagreeable odor as of burning horn.—The uses of

hair are manifest. On the head of man it is one of his chief ornaments, as well as a protection from injury; on the face it gives character and dignity; on the brows and lids, and at the entrance of the nose and ears, it prevents the contact and entrance of foreign bodies; and, even in man, the general covering of hairs doubtless contributes to the warmth and proper electric condition of the skin; the object of the hair in animals is obvious to every one.—The two essential parts of cortex and medulla are found in the hairs of all animals, however much they may differ in appearance. In the cats, seals, and other animals, the whiskers are supplied with large nerves, and become exquisite organs of touch; in the soft hair of the sable there is very little fibrous portion; in the musk and reindeer the entire substance seems to be composed of delicate polygonal cells; in the smaller rodents the cortical tubular portion is crossed by transverse partitions, partial or complete; in the bats the projections of the cortical scales are often arranged in whorls around the stem; in the peccary the cortical substance sends inward radiating processes whose interspaces are filled with the medullary portion, and this is essentially the structure of the quills of the porcupine, which, as Shakespeare has hinted, are only modified hairs; even the horn of the rhinoceros is only an assemblage of compact hairs, and does not differ in its essential structure from the finest wool. In proportion to the prominence of the imbricated scales will the hair of animals have the property of becoming felted.—In most nations the adornment of the hair has always formed one of the principal duties of the toilet, and the caprices of different races and epochs in this respect are very remarkable. While the Hebrews and Greeks considered long hair a beautiful object, the Egyptians, regarding it as an incumbrance, removed it, and substituted light wigs. The Roman ladies used artificial hair, dyed their own, sprinkled it with gold dust, and represented in it various fanciful devices. So desirable was a fine head of hair considered, that it became sacred, and was often dedicated to the gods on important occasions of marriage, victory, escape from danger and death, and burial of friends; plucking it out or neglecting it was a token of affliction. In the time of Francis I. short hair became the fashion, and under Louis XIII. long hair, curls, and wigs; then came hair powders, periwigs, and perukes of monstrous size, which were banished by the French revolution, since which civilized nations have been in the main content with natural heads of hair.—Some persons are born without hair on any part of the body; on the head it falls off after many febrile diseases, especially typhoid fever, and after erythematous affections of the scalp and irritating applications. Tightly fitting and unyielding hats no doubt contribute largely toward the premature fall and grayness of the hair. The bulbs are often diseased, and

in *plica Polonica* the hair, generally insensible, becomes exceedingly sensitive at the roots and liable to bleed. For the various diseases of the hair tonic and stimulating applications are sometimes beneficial; when the hair is thin and falls out easily, shaving the scalp will generally produce a thicker, firmer, and darker-colored growth. For diseases of the hair depending on parasites, see *EPIDRYTES*, and *EPIZOA*.—Microscopic examination shows that the hair of the negro is not wool, though differing considerably in form from that of Europeans; the form is not connected with the color; the differences in the form of the hair, being permanent, are considered by some as of the same specific value as those of the fur, feathers, and scales of lower animals. Straight hair approximates to the cylindrical form, but the curled or crisp varieties are flattened; the negro hair has the deepest longitudinal groove, and a transverse section like that of a bean, and its peculiar twist is said to be due to a greater tension of the fibres along this groove; the closely matted hair of the Bushman is very flat and ribbon-like, four or five times broader than thick.—Many insects are provided with hairs, both in the larval and perfect states, which afford beautiful microscopic objects, from their branches, tufts, spines, and protuberances. The cuticle of plants is often beset with hairs, made up of a linear series of elongated cells, attached end to end; they sometimes have glandular bodies connected with them, as those which secrete the viscosity on the leaf of the sundew (*drosera*), or the irritating liquid of the nettle. In the invertebrates and in plants there are many evident connecting links between hairs and scales; vegetable hairs generally exhibit the phenomena of rotating fluids, or circulation of currents.

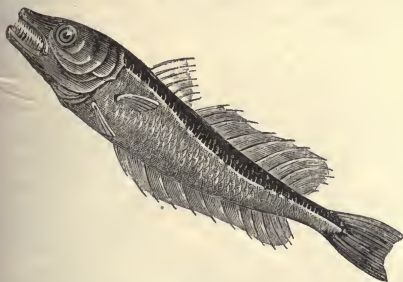
HAIR WORM (*gordius*), the type of the long hair-like annelids of the order (*gordiacea*) of helminths or entozoa. These thread-like parasites in their larva state inhabit the bodies of various insects, especially beetles and grasshoppers; they have a mouth and alimentary canal, but no anus; the sexes are distinct, and when full grown they leave the bodies of their hosts to deposit their eggs in long chains in water or in moist earth. They look very much like long horse hairs, and have been popularly believed to be hairs transformed to worms. They often attain a length very much greater than that of the body of the insect they infest, occupying with their coils the larger part of its body. They can endure a great amount of dryness without perishing.

HAIZINGER. I. Anton, a German vocalist, born at Wilfersdorf, Austria, in 1796, died in Carlsruhe, Dec. 31, 1869. He acquired celebrity as a tenor, and on retiring from the stage about 1840 he became director at Carlsruhe of a musical school, which trained many fine artists. **II.** Amalie, wife of the preceding, born in Carlsruhe in 1800. Her family name was Morstadt, and after the death of her first hus-

band, the actor Neumann, she married Haizinger. She became known as a comic actress in Carlsruhe, and since 1844 in Vienna.

HAJE. See ASP, and COBRA DE CAPELLO.

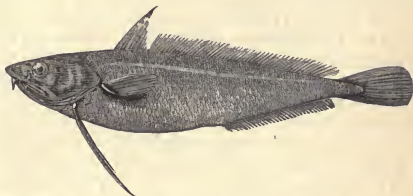
HAKE, a name properly applied to fishes of the cod family, of the genus *merlucius* (Cuv.), and improperly in New England to gadoids of the genus *phycis* (Artedi). There is great confusion in the application of the names to the first genus; the European *merlucius*, properly called hake, is styled the *merlan* or whiting in the Mediterranean; our *merlucius* is also generally called whiting, but the true whiting is a *merlangus*, one of the species of which we name pollack; the American hake, or *phycis*, is styled codling by De Kay, in order to avoid confusion. The European hake (*merlucius vulgaris*, Cuv.) is generically distinguished from the cod by having only two dorsal fins, a single long anal, and no barbule on the chin; the head is flattened, the body elongated, the first dorsal short, the second dorsal and the anal long and deeply emarginated. The color on the back is ashy gray, and below dirty white. The wide mouth is provided with numerous long, sharp, incurved teeth on both jaws, on the palate, and in the pharynx. It is abundant



European Hake (*Merlucius vulgaris*).

in the ocean and in the Mediterranean, and on the coasts of Ireland and Cornwall in immense shoals from June to September during the mackerel and herring seasons; it grows to a length of 1 or 2 ft., is very voracious, and feeds principally on the last mentioned fishes. Its flesh is white and flaky, and is dried in northern countries like that of the cod; from its inferior quality it is commonly called "poor John;" the liver is a delicate dish, and was highly esteemed by the ancients. The American hake (*M. albidus*, De Kay), very generally called whiting in New England, and sometimes silver hake, is 1 or 2 ft. long; when alive, the upper parts of the body and sides are rusty brown with golden reflections, becoming leaden after death; silvery white beneath; iris silvery; dorsals and caudal rusty, pectorals and ventrals sooty, anal colorless, inside of the mouth purple, and lateral line lighter than the upper parts; the lower jaw is the longer, and the teeth are very long and sharp. It is found

from New York northward, and is especially abundant in the British provinces; it is exceedingly voracious, pursuing the smaller fishes, and is caught in great numbers in some seasons both in nets and by hooks; its flesh, when fresh, is sweet and wholesome, but it soon becomes soft and tasteless.—The American hakes of the genus *phycis* have an elongated body;



White Hake (*Phycis Americanus*).

two dorsals, the first triangular with the third ray filamentous and prolonged, the second commencing just behind the first and extending nearly to the caudal; the ventrals with a single ray at the base, afterward divided; anal long and single; chin with one barbule. The white or common hake (*P. Americanus*, Storer) grows to a length of from 1 to 3 ft., and when alive is reddish brown above, bronzed upon the sides, and beneath whitish with minute black dots; upper edge of the dorsal black, as is the edge of the anal and end of the caudal; fins also dotted with black; after death the back becomes grayish brown, and the abdomen dirty white; the head is very flat above, broad, strongly convex back of the eyes, with prominent rounded snout and large eyes; upper jaw the longer, and both well armed with rows of sharp incurved teeth; teeth also on the vomer. It is found from the New Jersey coast northward, and is taken in large numbers, chiefly on muddy bottoms, and generally at night or on cloudy days; it feeds principally on small fish and crustaceans. It is an excellent fish for the table, fried or boiled; it is also valuable when salted, and in this condition is largely exported from the British provinces under the name of ling. There is a small species (*P. filamentosus*, Storer), called squirrel hake by the Massachusetts fishermen, which rarely exceeds a length of 18 in. or a weight of 2½ lbs.; the head is longer in proportion, the body more slender, top of the head depressed in its whole extent, and the filamentous ray of the first dorsal considerably longer than in the preceding species; there are no spots upon the pure white of the lower parts. Other species are described in America, on the coast of Europe, and in the Mediterranean.—The name hake is also erroneously given on the coast of New Jersey to the king fish, a scænoid of the genus *umbrina* (Cuv.), from its having a barbule on the chin.

HAKLUYT, Richard, an English author, born about 1553, died Oct. 23, 1616. He was educated at Westminster school and at Oxford

university, where he was appointed lecturer on cosmography and was the first to teach the use of globes. In 1582 he published "*Diuers Voyages touching the Discoverie of America and Islands adjacent unto the same*" (new ed., 1850). In 1584 he accompanied the English ambassador Sir Edward Stafford to Paris, probably as chaplain, as he was at this time professor of divinity. While there he published in French (1586) the narrative of the voyages of Loudonnière and others, which he afterward translated and published under the title "*Four Voyages unto Florida*," &c. (1587). He also published in Paris an improved edition of Peter Martyr's *De Orbe Novo* (1587), which at his suggestion was translated into English by Michael Lok, the London agent of the Muscovy company, under the title "*The Historie of the West Indies*." On his return to England in 1589 he was appointed by Sir Walter Raleigh a member of the company of gentlemen adventurers and merchants for colonizing Virginia; and in the same year he published his great work, "*The principal Navigations, Voyages, and Discoveries made by the English Nation*" (fol., London; enlarged ed., 3 vols. in 2, fol., 1598, '99, 1600; new ed. with additions, 5 vols. 4to, London, 1809-'12). Besides the different voyages, this work contains many curious public documents, such as charters

granted by the czar, the sultan, and other monarchs, to English merchants. In many copies the voyage to Cadiz (pp. 607-'19, vol. i., 2d ed.) is omitted, having been suppressed by order of Queen Elizabeth after the disgrace of the earl of Essex. The additions to the last edition comprise all the voyages and travels printed by Hakluyt, or at his suggestion, which were not included in his collection. In 1605 Hakluyt was appointed prebendary of Westminster, having previously been prebendary of Bristol; and he received afterward the rectory of Wetheringset in Suffolk. He was buried in Westminster abbey. His unpublished MSS. were used by Purchas in his "*Pilgrims*." His name is perpetuated in Hakluyt's head, a promontory on the N. W. end of Spitzbergen, named by Henry Hudson in 1608; in Hakluyt's island in Baffin bay, named by Bylot; and in the Hakluyt society, founded in 1846 for the republication of early voyages and travels. For an analysis of the contents of his chief work, see Oldys's "*British Librarian*."

HAKODADI, a city of Japan, in the province of Matsumai, near the S. end of the island of Yesso, on the N. side of the strait of Sangar about 42 m. N. E. of the city of Matsumai, and nearly in lat. 42° N.; pop. about 50,000, including many Chinese and some Europeans and Americans. It extends about 3 m. along



Hakodadi.

the base of a promontory whose peaks rise more than 1,100 ft. above the sea. The foliage of the lower slopes partly conceals the city, which is on the shore of a beautiful and spacious bay, forming one of the best harbors in the world. The town consists of rows of broad streets, rising one above the other, parallel to the beach. The houses are mostly of wood and two stories high, with fronts open to the street, and deep projecting eaves. At night the fronts are closed by folding doors or shutters. There are many large temples in the city, some of the Sintoo and others of the Buddhist sect; some of the latter are well built and gorgeously decorated. They are generally in the elevated and retired parts of the town, and

partially encircled by trees. A bazaar is attached to one of the temples. There are many fire-proof stores, strongly built, with thick whitewashed walls, deep window gratings, and massive shutters. The principal articles of trade are seaweed (*fucus saccharinus*), timber, dried fish, deer skins, horns, potatoes, coal, fish oil, tobacco, salt, and silk. The harbor is constantly thronged with hundreds of junks, and the general dullness of the city is relieved by droves of laden pack horses. The aggregate value of imports and exports in 1870 exceeded \$1,300,000.—Originally a small fishing village belonging to the local daimio, Hakodadi was sold to the Japanese government, and owing to its advantages as a seaport rapidly rose into

importance. It was opened to American commerce by the treaty negotiated by Commodore Perry in 1854, which has since been extended to all foreign nations.

HALAS, a market town of Hungary, in the district of Little Cumania, about 75 m. S. S. E. of Pesth; pop. in 1870, 13,127. It has a Reformed gymnasium. The inhabitants are chiefly engaged in the breeding of cattle and the cultivation of the vine.

HALBERSTADT, a town of Prussian Saxony, in the district and 28 m. S. W. of the city of Magdeburg, on the right bank of the Holzemme; pop. in 1871, 25,421. The principal public buildings are the Dom or cathedral, a Gothic structure restored in 1850, which contains celebrated collections of the episcopal and priestly robes of the middle ages, and the Liebfrauenkirche, erected in the 11th century, in the Byzantine style, with singular bass-reliefs and wall paintings. Halberstadt has a gymnasium and a number of schools, two large libraries, and good collections of coins, antiquities, and pictures, many of the last in the so-called "temple of friendship." The chief manufactures are woollen cloth, gloves, carpets, refined sugar, leather, tobacco, cigars, and chemical products. The poet Gleim gathered around him in this town a large circle of authors, which was called the poetical union of Halberstadt; and he was buried here. In the middle ages the bishopric of Halberstadt formed a state of the empire.

HALBIG, Johann, a German sculptor, born at Donnersdorf, Bavaria, July 13, 1814. He was educated in the academy of Munich, and became professor of statuary there. Since 1835 he has executed the group of lions for the old Pinakothek, the statues of Roma and Minerva in the royal park, and many other important works in Munich and other German cities, in Russia, and in Belgium. He is said to have modelled since 1846 more than 1,000 busts. His most celebrated works are the group of lions at the Munich gate of Victory, and the 18 figures representing the principal states of Germany in the hall of independence at Kelheim; the statue of Christ on the cross in the Campo Santo of Munich (1853); the monument in honor of Maximilian II. in the town (1854), and that at the port of Lindau; and an allegorical group representing North America for a gentleman of New York. In 1873 he was commissioned by Louis II. of Bavaria to prepare a colossal group of the crucifixion to be erected on the mountain near Oberammergau; and in 1874 he designed a statue of the late king William of Wurtemberg for the town of Canstatt.

HALDANE. I. Robert, a Scottish philanthropist, born in 1764, died Dec. 12, 1842. Though heir to a large property, he had a passion for a seafaring life, and in 1780 entered the royal navy, in which he served with honor under Capt. Jervis, afterward Earl St. Vincent. He retired from the navy in 1783, and in 1785

married and settled upon his estate of Airthrey. He welcomed the advent of the French revolution, and was consequently exposed to much obloquy; but, disappointed by the revolutionary excesses, and convinced of the divine origin of Christianity, he resolved to devote his life to its advancement. He conceived the idea of organizing a vast scheme of missionary labor in India, including the establishment of schools and a printing press, all the expenses to be borne by himself. The East India company, suspecting some hidden design, refused to sanction the scheme, and Haldane was forced to abandon it. He then selected Scotland as his field of work, sold his estate, and devoted his means to hiring and erecting places for worship, and to educating young men for the ministry. His efforts were highly successful in this respect. Afterward he formed a plan for the evangelization of Africa, and imported 30 children from Sierra Leone to receive Christian education, giving his bond for £7,000 to pay the expenses. At the commencement of his revival labors in Scotland he seceded from the established church and adopted many of the tenets of Sandeman, with some rigid forms of discipline; and he afterward joined the Baptists, but gave no prominence to peculiar sectarian views. He published a work on the "Evidence and Authority of Divine Revelation" (Edinburgh, 1816), an "Exposition of the Epistle to the Romans" (London, 1835), and several minor writings. **II. James Alexander**, brother of the preceding, born in Dundee, July 14, 1768, died in Edinburgh, Feb. 8, 1851. In 1785 he went to sea in the service of the East India company, and in 1793 was appointed captain of a ship. But while the vessel was detained he experienced a religious change like that of his brother. He sold his commission and his share of the ship's property for £15,000, retired to Scotland, and devoted himself to religious labors. He made journeys through the country, gathering large congregations, for which churches were immediately built by his brother Robert. In 1799 he became pastor of the Tabernacle in Leith walk, Edinburgh, in which office he continued without emolument for more than 50 years. His life, with that of his brother, was written by Alexander Haldane (London, 1852).

HALDEMAN, S. Stehman, an American naturalist and philologist, born near Columbia, Pa., in 1812. He was educated at Dickinson college, and in 1836 became assistant in the geological survey of New Jersey, and in 1837 of Pennsylvania, and discovered the *scolithus lineasis*, the oldest fossil then known. In 1851 he became professor of natural history in the university of Pennsylvania, and in 1855 in Delaware college, and also of geology and chemistry to the state agricultural society of Pennsylvania. He has made numerous contributions to entomology, conchology, and philology, including "Monograph of the Fresh-Water Univalve Mollusca" (Philadelphia, 1840-'45); *Mono-*

graphie du genre leptoxis (in Chenu's *Illustrations conchologiques*, Paris, 1847); "On some Points in Linguistic Ethnology" (in "Proceedings of the American Academy," Boston, 1849); "Zoology of the Invertebrate Animals" (in the "Iconographic Encyclopedia," New York, 1850); "On the Relations of the English and Chinese Languages" (in "Proceedings of the American Association for the Advancement of Science," 1856); and "Analytic Orthography," which in 1858 gained in England a prize over 18 European competitors.

HALDIMAND, a S. county of Ontario, Canada, bordering on Lake Erie near its E. end; area, 475 sq. m.; pop. in 1871, 24,851, of whom 7,792 were of English, 6,991 of Irish, 4,768 of German, and 3,078 of Scotch origin or descent. It is drained by Grand river, and is traversed by the Grand Trunk, the Great Western, Canada Southern, and Hamilton and Lake Erie railways. Capital, Cayuga.

HALE, a central county of Alabama, bounded W. by the Black Warrior river, and drained by its affluents; area, about 600 sq. m.; pop. in 1870, 21,792, of whom 16,990 were colored. The surface is moderately uneven, and the soil very fertile. The Alabama and Chattanooga railroad passes through the N. W. corner; the Alabama Central skirts the S. border; the Selma, Marion, and Memphis line runs to the county seat. The chief productions in 1870 were 384,420 bushels of Indian corn, 26,462 of sweet potatoes, and 18,573 bales of cotton. There were 1,176 horses, 2,734 mules and asses, 2,494 milch cows, 4,435 other cattle, 2,626 sheep, and 9,019 swine; 9 flour mills, and 1 machine shop. Capital, Greensboro.

HALE, Benjamin, an American clergyman, born at Newburyport, Mass., Nov. 23, 1797, died there, July 15, 1863. He graduated at Bowdoin college in 1818, studied theology at Andover, and in 1822 was licensed to preach as a Congregationalist. In 1823 he became tutor in Bowdoin college, but soon after established the Gardiner lyceum, of which he was principal for four years. From 1827 to 1835 he was professor of chemistry and mineralogy in Dartmouth college, and in the mean while took orders in the Protestant Episcopal church. In 1836 he became president of Hobart college, Geneva, N. Y., and held the position for about 20 years; he then resigned on account of impaired health, and returned to his native town. Besides sermons and pamphlets on education, he published "Introduction to the Mechanical Principles of Carpentry" (1827), and "Scriptural Illustrations of the Liturgy" (1835).

HALE, David, an American journalist, born at Lisbon, Conn., April 25, 1791, died at Fredericksburg, Va., Jan. 20, 1849. His father was a clergyman, from whom and in the common school he received his education. In 1809 he went to Boston, where he entered into mercantile business, and also contributed to newspapers. In 1827 he removed to New York to become commercial editor of the "Journal of

Commerce," of which in the following year he became one of the proprietors. The "Journal" soon acquired an influential position, and afforded a large income to its owners. Mr. Hale contributed largely to benevolent and religious enterprises, and for many years supported several missionaries in the thinly settled parts of the country. A memoir of him by the Rev. J. P. Thompson, embracing some of his writings, was published in 1849.

HALE, Edward Everett, an American author, son of the journalist Nathan Hale, born in Boston, April 3, 1822. He graduated at Harvard college in 1839, studied theology, and was pastor of the church of the Unity, Worcester, Mass., from 1846 to 1856. In the latter year he was called to the South Congregational church of Boston, of which he is still pastor (1874). He has been at different periods editor of the "Christian Examiner" and the "Sunday School Gazette," besides being a frequent contributor to other literary and theological journals. In 1869 he founded "Old and New," a literary and critical monthly, mainly devoted to social reform, to which he has been the principal contributor. His separate works are: "The Rosary" (1848); "Margaret Percival in America" (1850); "Sketches of Christian History" (1850); "Letters on Irish Emigration" (1852); "Kansas and Nebraska" (1854); "Ninety Days' Worth of Europe" (1861); "The Man without a Country;" "If, Yes, and Perhaps" (1868); "The Ingham Papers" (1869); "How to Do it;" "His Level Best;" "Ten times One is Ten: the possible Reformation" (1870); "Ups and Downs;" "Sybaris and Other Homes" (1870); "Christmas Eve and Christmas Day;" "In His Name;" "Working Men's Homes" (1874); and many historical papers published by the American antiquarian society.

HALE, John Parker, an American statesman, born in Rochester, N. H., March 31, 1806, died in Dover, N. H., Nov. 19, 1873. He graduated at Bowdoin college in 1827, and took up his residence at Dover, where he was admitted to the bar in 1830. In 1832 he represented that town in the state legislature, and in 1834 President Jackson appointed him United States attorney for the district of New Hampshire. This office he held till 1841, when President Tyler removed him on political grounds. In 1843 he was elected as a democrat to congress, where he sided with the opponents of slavery. In the presidential canvass of 1844 he opposed the scheme for annexing Texas, and was renominated for congress. The New Hampshire legislature having passed a resolution instructing the congressional delegation from that state to support the annexation measure, Mr. Hale addressed a letter to the people of New Hampshire, in which he declared that the annexation of Texas was demanded for the purpose of strengthening and perpetuating slavery, and that if the people wished their representatives to support such a measure they must choose another man

than himself to represent them. The state convention struck his name from the ticket and placed another nominee in his stead. Mr. Hale ran as an independent candidate, supported chiefly by the "independent democrats," but was defeated. In June, 1845, he attempted to make a speech in the Old North church at Concord, vindicating his course; but frequent interruptions soon turned it into a sharp debate between himself and Franklin Pierce, which lasted from 2 P. M. till sundown, and is still the most memorable in the history of New Hampshire. The popular verdict gave the victory to Hale. In the following year he was elected to the legislature, became speaker of the house, and before the close of the session was chosen United States senator for six years from March, 1847. In the senate he steadily maintained the position he had taken on the slavery question, and opposed the compromise measures of Clay. In 1851 he was counsel for the defendants in the trials which grew out of the rescue of the fugitive slave Shadrach. In 1847 the liberty party convention at Cleveland gave him a nomination for president, which he declined, and supported the Van Buren and Adams ticket in 1848. In 1852 he was nominated at Pittsburgh by the free-soil party, and received 157,685 votes. From 1853 to 1855 he practised law in the city of New York, and in the latter year was again elected as United States senator from New Hampshire, to fill the unexpired term of Mr. Atherton, deceased. In 1858 he was reelected for a full term of six years. To the administration of President Lincoln he gave a hearty support, speaking frequently on the most important subjects of legislation during the civil war. On retiring from the senate in March, 1865, he was appointed minister to Spain. He had discharged the duties of this office for about three years, when a quarrel arose between himself and Mr. Perry, his secretary of legation. Mr. Hale was charged with evading the revenue laws of Spain by importing, under his privilege as a minister, goods which were put upon the market and sold as ordinary merchandise. He averred that the secretary was the real culprit, and that he had used the signature of the minister without his knowledge for illegal purposes. The result was that both minister and secretary were recalled by President Grant. Returning from Europe in 1870, Mr. Hale was prostrated by paralysis, and in the summer of 1873 his hip was dislocated by a fall, which was the immediate cause of his death.

HALE, Sir Matthew, an English jurist, born at Alderley, Gloucestershire, Nov. 1, 1609, died there, Dec. 25, 1676. His father, originally a lawyer, abandoned his profession on account of conscientious scruples. The son, an orphan at an early age, was committed to the care of a Puritan relative, who placed his ward in 1626 at Magdalen hall, Oxford. He had been designed for the church, but becoming involved

in a lawsuit with a person who laid claim to part of his paternal estate, he exhibited such aptitude for legal science that the lawyer who was charged with the defence of his case persuaded him to study law. He applied himself with remarkable diligence, reading, it is said, for several years at the rate of 16 hours a day. The variety of his studies was remarkable. Philosophy, anatomy, and physiology, as well as theology, are mentioned as only a few of the subjects which received his attention. He probably began practice as a barrister in 1636; and he was employed in most of the celebrated trials growing out of parliamentary troubles in 1640. Bishop Burnet states that Hale was assigned as counsel for Strafford, but he is believed to have been only privately retained by that nobleman to assist in his defence. In 1643, however, he was expressly assigned by parliament as counsel for Archbishop Laud. In 1647 he was appointed one of the counsel for the eleven members of the commons whose impeachment was demanded by the army. He is said to have been retained as counsel for the defence of Charles I.; but as the king refused to acknowledge the jurisdiction of the court, his counsel took no public part in the proceedings of the trial. In 1643 Hale had taken the covenant as prescribed by parliament; in 1651 he professed allegiance to the commonwealth, "without king or house of lords;" and in the following year he was one of a commission for considering the expediency of reforming the law. He was raised to the bench of the court of common pleas in 1654, and soon afterward was returned to Cromwell's first parliament for his native county. Several instances are related of his resolute rejection of the arbitrary dictation of Cromwell in the administration of law. On one occasion he discharged a jury which he discovered had been packed by express directions of the protector. Cromwell reprimanded him severely, adding, "You are not fit to be a judge." "That," replied Hale quietly, "is very true;" and soon after he declined to serve on the trial of a person who had revolted against Cromwell's authority. In 1659 he represented the university of Oxford in the parliament which met after the death of Cromwell; and in the following year he sat again for Gloucestershire in the convention which recalled the Stuarts. Soon after the restoration, the lord chancellor Clarendon with some difficulty persuaded him to accept the appointment of lord chief baron of the court of exchequer (1660), when he was knighted. His name appears among the commissioners for the trial of the regicides, but it is supposed that he was not present at the trials. During the period that he sat in the court of exchequer two women were indicted for witchcraft. Hale is reported to have admitted to the jury that he did not doubt the existence of "such creatures as witches." The women were condemned and executed. He was the last English judge to sanction the con-

viction of prisoners charged with this crime. After the great fire in London in 1666, his exertions with a view to improvements in the rebuilding of the city obtained for him the highest praise. "He was," says Baxter, "the great instrument for rebuilding London; his prudence and justice removing multitudes of impediments." In 1671 Hale was made chief justice of the court of king's bench, and four years later he was attacked by inflammation of the diaphragm, which in 1676 compelled him to retire upon his pension. Withdrawing to Acton, he amused himself principally in the study of mathematics and physics. He was twice married; and by his first wife, the daughter of Sir Henry Moore, he had ten children. His second wife was a servant girl, whom he married in order to have a nurse in his declining years, and whom in his will he called a "most dutiful, faithful, and loving wife." She was appointed one of his executors, and to her he confided the education of his grandchildren. After his death were published several works which have created for him a high reputation as a legal and constitutional writer. His *Historia Placitorum Coronæ* (1678, several times edited with additions by various hands), a work of great authority, and the "History of the Common Law" (6th ed., by C. Runnington, 8vo, London, 1820), may be specially cited. The treatise on the "Original Institution, Power, and Jurisdiction of Parliament" (1709), which bears his name, was written, according to Hargrave, by some other person. Sir Matthew Hale's moral and religious works, with his life by Bishop Burnet, were published by the Rev. T. Thirlwall (2 vols. 8vo, London, 1805).

HALE, I. Nathan, an American soldier, born in Coventry, Conn., June 6, 1755, executed in New York, Sept. 22, 1776. He graduated at Yale college in 1773, and became a teacher at East Haddam, and afterward at New London. His parents intended him for the ministry; but in 1775 he entered the army as lieutenant, and in a few months was made captain. In September, 1776, when in New York, he with an associate captured a British sloop laden with provisions, taking her at midnight from under the guns of a frigate, and distributing her prize goods to the American soldiers. After the retreat of the army from Long Island, Washington applied for a discreet officer to enter the enemy's lines and procure intelligence, and Hale volunteered for the service. He passed in disguise to the British camp, and made full drawings and memoranda of all the desired information. On his return he was captured and taken before Sir William Howe, by whom he was ordered to be executed the next morning; and he was hanged as a spy, saying with his last breath, "I only regret that I have but one life to lose for my country." Dwight extolled him in prose and verse.—See "Life of Capt. Nathan Hale, the Martyr Spy," by I. W. Stuart (12mo, Hartford, 1856). **II. Nathan**, an American journalist, nephew of the preceding,

born at Westhampton, Mass., Aug. 16, 1784, died at Brookline, Feb. 9, 1863. He graduated at Williams college in 1804, studied law, and was for two years an instructor in the academy at Exeter, N. H. He then removed to Boston, was admitted to the bar in 1810, practised for four years, and was also one of the editors of the "Boston Weekly Messenger," the first weekly periodical in America devoted to literature and politics. In 1814 he purchased the Boston "Daily Advertiser," the first and for many years the only daily newspaper in New England. This journal, of federal and afterward whig politics, for many years under his charge, exercised a wide influence. It opposed the Missouri bill in 1820, and the Nebraska bill in 1854, and was the first newspaper to urge the immediate free colonization of Kansas. Mr. Hale served several terms in the legislature of Massachusetts, occupied other public offices, was for 19 years president of the Boston and Worcester railroad, the first in New England upon which steam power was used, and was the head of the commission which introduced water into Boston in 1848. He made many improvements in printing, and was among the founders of the "North American Review" and the "Christian Examiner." He published an excellent map of New England (1825), a work on the protective policy (1828), and a series of stereotype maps on a plan of his own invention (1830). His wife was a sister of Edward Everett, and he was the father of the Rev. E. E. Hale.

HALE, Sarah Josepha (Buell), an American authoress, born at Newport, N. H., in 1795. In 1814 she married David Hale, a prominent lawyer, and upon his death in 1822 she was left with five young children dependent upon her for support. In 1828 she became editor of the Boston "Ladies' Magazine," which was in 1837 united with "Godey's Lady's Book," Philadelphia, Mrs. Hale continuing to be one of the editors. Besides her editorial labors she has published more than 20 separate works, among which are: "The Genius of Oblivion, and other Poems" (1823); "Northwood," a novel (1827); "Traits of American Life" (1835); "Ladies' New Book of Cookery" (1852); "Dictionary of Poetical Quotations" (1852); "New Household Receipt Book" (1853); "Woman's Record, Sketches of Distinguished Women" (1853); "Liberia, or Mr. Peyton's Experiment" (1854); "Letters of Madame de Sévigné," and "Letters of Lady Mary Wortley Montagu" (1856).

HALES, Alexander of. See ALEXANDER OF HALES.

HALES, Stephen, an English clergyman, born at Becclesbourn, Kent, Sept. 7, 1677, died at Teddington, Middlesex, Jan. 4, 1761. He studied theology at Cambridge, became perpetual curate of Teddington, and received several other livings. He devoted himself to scientific pursuits, and in 1717 was made a member of the royal society, and in 1753 a foreign

associate of the French academy of sciences. He acquired eminence by his "Vegetable Statics" (1727-'31; republished under the title of "Statistical Essays" in 1733 and 1769), one of the earliest works on vegetable physiology; it has been translated into several languages. He wrote other works, produced some valuable inventions, and is regarded as one of the first advocates of temperance societies.

HALÉVY. I. Jacques François Fromental Elie, a French composer, born in Paris, May 27, 1799, died in Nice, March 17, 1862. His parents were Jews, and placed their son under musical instruction at the conservatory at the age of 10. His successive teachers were Cazot, Lambert, Berton, Cherubini, and for a brief period Mehul. By Cherubini, who always remained his friend, he was taught for five years. At 20 he obtained the first prize for composition at the academy of fine arts, entitling him to a pensionary residence of two years at Rome, of which he availed himself. He returned to France in 1822, and for five years besought the managers in vain to produce either his grand opera *Pygmalion* or his comic opera *Les deux pavillons*. At last in 1827 his one-act opera *L'Artisan* was brought out with moderate success at the Théâtre Feydeau. In 1829 he had better fortune at the Théâtre Italien with his three-act opera *Clari*, since Malibran assumed the principal rôle. In 1830 a grand ballet in three acts, *Manon Lescaut*, the text written by Scribe, was produced. In 1835 *La Juive*, the opera through which he achieved his widest reputation, was represented at the royal academy of music; and it has since been heard at most of the principal opera houses of the world. Of his many subsequent operas, some of which obtained a celebrity almost equal to that of *La Juive*, the principal are: *L'Eclair* (1835), *La reine de Chypre* (1841), *Charles VI.* (1843), *Les mousquetaires de la reine* (1846), *Le val d'Andorre* (1848), *Le Juif errant* (1852), *Jacquarita* (1855), and *La magicienne* (1857). Though Halévy won the esteem of all musicians and considerable popularity, he had not sufficient genius to place himself in the first rank of composers. The impression left by the best of his operas is that they are the work of a man of unquestionable talent, of profound and exact learning, of industry, and of considerable melodic invention, but the music is often elaborate to the point of dulness. He wrote in all more than 30 operas, five or six of which still keep the stage. He was also distinguished as a graceful writer on musical subjects, and wrote *Leçons de lecture musicale* (1857), adopted as a text book in the schools of Paris; *Souvenirs et portraits, études sur les beaux-arts* (1860); and *Derniers souvenirs et portraits* (posthumous, 1863). He succeeded Fétis as professor of composition at the conservatory, and perpetual secretary of the academy of fine arts. A pension of 5,000 francs was bestowed upon his widow by the French government. His biography was written by his brother Léon

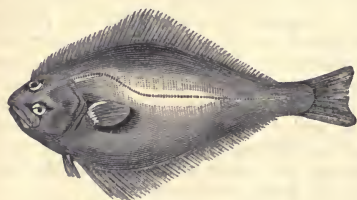
(*F. Halévy, sa vie et ses œuvres*, 1862). **II. Léon**, a French author, brother of the preceding, born in Paris, Jan. 14, 1802. He left the Charlemagne lyceum with the reputation of a distinguished Greek scholar and poet, and some of his metrical translations from the Greek were published in 1817. He became a disciple of Saint-Simon and one of the founders of *Le Producteur*, and wrote the introduction to his master's *Opinions littéraires, philosophiques et industrielles* (1825). From 1831 to 1834 he was adjunct professor of literature at the polytechnic school, and from 1837 to 1857 he was connected with, and for some years chief of, the bureau of historical monuments in the ministry of the interior. His *Fables* (1843), *Fables nouvelles* (1855), and *La Grèce tragique* (3 vols., 1845-'61) won prizes from the academy. Among his other works is *Résumé de l'histoire des Juifs* (2 vols., 1827-'8). He also translated "Macbeth," and wrote much for the stage, his tragedies comprising *Électre* (1864), and *Luther, ou la diète de Worms* (1865). **III. Ludovic**, a French dramatist, son of the preceding, born in Paris in 1834. He was employed from 1852 to 1858 in the ministry of state, and till 1861 as chief of bureau in the ministry for Algeria and the colonies. He is the author of the libretti for the bouffe operas *Orphée aux enfers* (1861), *La belle Hélène* (1865), *Barbe-Bleue* (1866), *La grande duchesse* (1867), *La Périochole* (1868), *Froufrou* (1869), and for other operas by Offenbach and various composers. Among his recent productions are the comedy *Tricocche et Cacolet* (1871), the vaudeville *Réveillon* (1872), and a collection of equivocal sketches, including *Madame et Monsieur Cardinal* (1872). His father and other writers have been associated with him in various works.

HALFORD, Sir Henry, an English physician, born in Leicester, Oct. 2, 1766, died in London, March 9, 1844. He was the son of Dr. James Vaughan, and took the name of Halford in 1814, upon inheriting a large estate from Sir Charles Halford, a distant relation on his mother's side. He was educated at Rugby and Oxford, was elected a fellow of the college of physicians in 1794, and almost immediately embarked in a large practice in London. He was made a baronet in 1809, and was physician to George III., George IV., William IV., and Victoria. In 1824 he was elected president of the college of physicians. He published a volume of "Essays and Orations" (1831; 3d ed., 1842), in which is contained an account of the discovery in 1813 of the head of Charles I. in the vaults of St. George's chapel, Windsor; "The Death of some Eminent Persons of Modern Times" (1835); and *Nugæ Metricæ*, consisting of Latin poems and translations (1842).

HALIBURTON, Thomas Chandler, a Canadian humorist, known by the nom de plume of "Sam Slick," born at Windsor, Nova Scotia, in 1796, died at Isleworth, England, Aug. 27, 1865. He studied law, was called to the bar in 1820, became chief justice of common pleas

in 1829, and judge of the supreme court of Nova Scotia in 1840. In 1842 he took up his residence in England, and in 1859 was returned to parliament for Launceston, holding his seat until his death. In 1835 he wrote a series of newspaper sketches satirizing the Yankee character, which were published in 1837 under the title of "The Clockmaker, or Sayings and Doings of Samuel Slick of Slickville," of which subsequent series appeared in 1838 and 1840. He also wrote "Historical and Statistical Account of Nova Scotia" (1829); "Bubbles of Canada," "The Old Judge, or Life in a Colony," and "Letter Bag of the Great Western" (1839); "The Attaché, or Sam Slick in England" (1843; 2d series, 1844); "Rule and Misrule of the English in America" (1851); "Yankee Stories" and "Traits of American Humor" (1852); and "Nature and Human Nature" (1855).

HALIBUT, a fish of the family *planidae* and genus *hippoglossus* (Cuv.). The genus is characterized by a flat oblong body, compressed vertically; the eyes and colored surface are on the right side; the lips large and fleshy, the lower jaw the longer; both jaws and the pharynx armed with sharp and strong teeth, in some portions card-like. The common species (*H. vulgaris*, Cuv.) grows to a length of from 3 to 6 ft., varying in weight from 100 to 500



Halibut (*Hippoglossus vulgaris*).

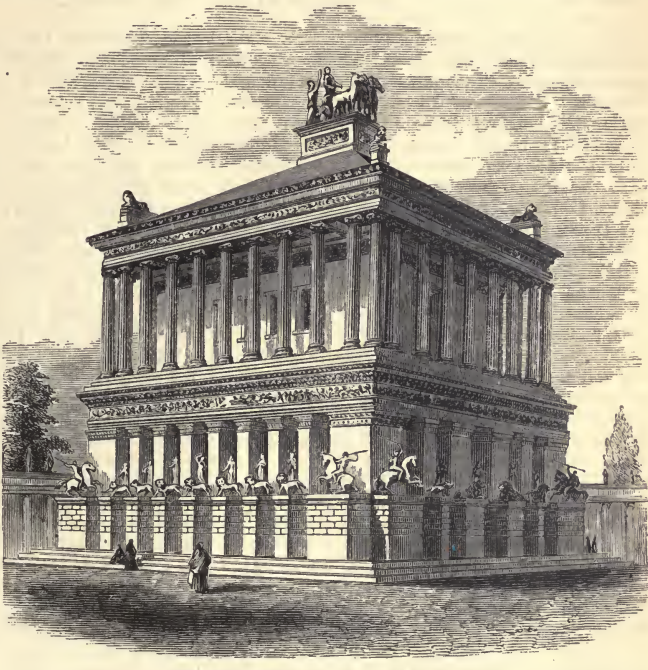
lbs.; a specimen is on record, taken on the coast of Maine, which weighed more than 600 lbs. The right side is of an almost uniform dark brown, and the left or under surface pure white; in rare instances, the eyes and the colored surface are on the left side. The dorsal fin arises over the anterior third of the eye, ending at the fleshy portion of the caudal fin; the pectorals arise just back of the operculum; the ventrals are small, beneath the base of the pectorals; the anal extends from the posterior half of the pectorals to near the tail. Of two apertures in front of the anal fin, the anterior is the anus, the posterior the urinary outlet. It is found from the coast of New York to Greenland, and also on the northern shores of Europe; the Boston market is supplied principally from George's banks and Nantucket shoals; in summer it is caught by hook and line in shallow water, retiring to deeper in the winter; it is abundant in the bay of Fundy and in the waters of Nova Scotia. It is exceedingly voracious; its flesh is coarse and dry, but much esteemed by some, when boiled or fried; the fins are considered a delicacy;

large quantities of the flesh, dried, salted, or smoked, are consumed by the Greenlanders and other northern nations. In the United States it sells for a higher price than cod; in England it is not much esteemed.—For the characters of this family, see FLOUNDER.

HALICARNASSUS (originally called Zephyria), an ancient city of Caria in Asia Minor, on the Ceramic gulf. Its site is now occupied by the town of Bodrum or Budrun, 96 m. S. of Smyrna (pop. about 10,000), one of the most miserable of Turkish towns, notable only for the remains of the ancient city. Halicarnassus was founded by a colony from Troezen, and was one of the six cities which constituted the Doric hexapolis. It was afterward excluded from that confederacy, and was conquered by the Persians under Darius, who permitted Lygdamis, a Greek, to rule it under his authority, with the title of dynast. Under Lygdamis and his successors Halicarnassus retained its Grecian character and language, but remained faithful to Persia; and Artemisia, his daughter and successor, fought in the fleet of Xerxes at Salamis. About 380 B. C. the city appears as subject to independent Carian princes, the most famous of whom was Mausolus, husband and brother of the younger Artemisia, who restored and fortified it. He died in 352, and over his remains Artemisia caused to be raised a monument so beautiful that it still gives a name to similar structures. Not long afterward the city reverted to Persia by the marriage of one of its queens with a Persian satrap, and after a long siege it was taken by Alexander of Macedon, who destroyed most of it by fire. From this catastrophe it never wholly recovered. It afterward passed under the sway of the Ptolemies of Egypt, and still later of the Romans, who assigned it to the government of Rhodes after their victory over Antiochus the Great of Syria (190 B. C.); it was afterward annexed to the province of Asia. On the downfall of the Roman empire it was laid in ruins, and after the knights of St. John had occupied Rhodes they built here about 1402 a castle called the "tower of St. Peter." At the final siege of the island by the Turks (1522) the knights caused this fortress to be repaired with stones taken from the ruins of the ancient city. The place was known at this time by the name of Mesy. Halicarnassus was the birthplace of the historians Herodotus and Dionysius.—The plan of the city was grand and symmetrical. From the edge of the harbor the buildings rose on terraces, formed partly by excavations from the rock and partly by walls of masonry. The first terrace was crowned by the Mausoleum, the second by the temple of Mars. Two citadels occupied volcanic hills at the upper end of the city, while the whole was enclosed by a wall which can still be traced. The palace of Mausolus and the temple of Venus and Mercury probably stood on the two points of the harbor, forming the extremities of the city. The fountain of Salmacis, a theatre

of which the ruins are yet prominent, and various beautiful temples, were among the other attractive features of the city. The most celebrated monument was the Mausoleum, which ranked among the seven wonders of the world. It was built by Pytheus in conjunction with Satyrus, and the sculptures are ascribed to Scopas, Bryaxis, Timotheus, and Leochares. The share of Timotheus, however, is assigned by some Greek writers to Praxiteles. It was still standing in the 12th century, but was overthrown either by an earthquake or by lightning before the building of the castle by the knights of St. John; and the detritus washed down from the hills, which filled the lower part of the city in some places to the depth of 20 ft., and concealed parts of the terraces, completely covered its site. In 1522 the knights, in removing some half-buried white marble, discovered a richly decorated and sculptured chamber, leading into a smaller apartment, where they found a sarcophagus and a beautiful vase, which they left untouched, but next morning they returned and found the tomb rifled. These chambers were undoubtedly the interior of the Mausoleum. The site of the ancient town was discovered in 1839 by Lieut. Brock, and in 1846 the English ambassador obtained permission to remove a number of slabs, which were deposited in the British museum. Most of them had suffered severely, the heads of the figures being nearly all wanting, but a few are magnificent specimens of art. All attempts to rediscover the Mausoleum proved futile, until in 1856 Mr. Newton, the British vice consul at Mitylene, undertook a more thorough search than had yet been made. Three ships were placed by government at his disposal, and most of the excavation was done by their crews. Several experiments were made in digging before the site of the Mausoleum was reached. On Jan. 1, 1857, Mr. Newton began digging at the foot of the highest terrace, on the spot which he had himself designated in 1848 as the probable site of the Mausoleum. By the beginning of April he had cleared the entire rocky platform which formed the foundation of the building. It is almost a square, measur-

ing 472 ft. in circumference, and formed by quarrying into the solid rock. On the W. side of the platform there was a flight of steps leading to the upper terrace. The entrance to the inner tomb was probably on this side, and was closed after the corpse had been carried in by a huge stone, which was then in its place. Behind this stone was found an alabaster vase bearing two inscriptions, one in Egyptian, the other in cuneiform characters, signifying "Xerxes the great king." In the rubbish which covered the foundation were imbedded parts of friezes and colossal statues, and four slabs, representing a battle of Amazons, in excellent preservation. Extending his excavations beyond the foundation bed, Mr. New-



The Mausoleum, as restored by Fergusson.

ton unearthed a number of flat blocks of white marble, halves of two colossal horses, and portions of a chariot. The figures, more or less complete, of several lions, a leopard, a woman in beautiful drapery without head or arms, the head of a man which proved to be that of Mausolus, and some ornamented lions' heads and capitals of columns, were also found here, and parts of a chariot wheel on the other side. The relics collected from various quarters comprised a number of standing or sitting statues from 8 to 12 ft. high, many lions, parts of friezes, and a multitude of fragments, all which were removed to the British museum, where the statue of Mausolus has been reconstructed out of 63 pieces, and is nearly com-

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plete. A female figure, wanting the head, has also been restored, and is one of the finest specimens of art recovered from Halicarnassus. Like all the architectural and sculptural parts of the Mausoleum, it was painted. With the aid of the partial measurements afforded by Pliny,

Mr. Newton, and subsequently Mr. Fergusson (see engraving), attempted to reconstruct the Mausoleum. The result is two designs widely differing from each other. Mr. Newton believes that it was a rectangular building surrounded by an Ionic portico of 36 columns, and surmount-



Portions of the Friezes of the Mausoleum.

ed by a pyramid rising in 24 steps, upon the summit of which was a colossal marble quadriga with a statue of Mausolus.—See Newton and Pullan's "History of Discoveries at Halicarnassus, Cnidus, and Branchidae" (2 vols., London, 1862); James Fergusson's "The Mausoleum of Halicarnassus, restored in conformity with the Remains recently discovered" (with plates, London, 1862); and Newton's "Travels and Discoveries in the Levant" (2 vols., 1865).

HALICORE. See DUGONG.

HALIFAX. I. A S. county of Virginia, bordering on North Carolina, bounded N. and E. by Staunton river, and intersected by the Dan; area, 960 sq. m.; pop. in 1870, 27,828, of whom 16,266 were colored. The surface is hilly and the soil fertile; and there are some minerals, among which is plumbago, of which a rich mine was formerly worked. It is intersected by the Richmond, Danville, and Piedmont railroad. The chief productions in 1870 were 123,763 bushels of wheat, 387,227 of Indian corn, 168,970 of oats, 5,950 of Irish potatoes, 7,896 of sweet potatoes, and 3,838,284 lbs. of tobacco. There were 1,939 horses, 987 mules and asses, 2,713 milch cows, 1,207 working oxen, 2,557 other cattle, 3,832 sheep, and 11,157 swine; 4 manufactories of agricultural implements, and 5 saw mills. Capital, Banister, or Halifax Court House. II. A N. E. county of North Carolina, bounded N. E. by the Roanoke river; area, 680 sq. m.; pop. in 1870, 20,408, of whom 13,990 were colored. The surface is diversified and the soil fertile. The Wilmington and Weldon, the Richmond, Fredericksburg, and Potomac, the Raleigh and Gaston, and the Seaboard and Roanoke railroads traverse it. The chief productions in 1870 were 5,577 bushels of wheat, 353,808 of Indian corn, 25,367 of oats, 3,357 of peas and beans, 8,491 of Irish and 28,169 of sweet potatoes, 2,321 tons of hay, and 11,716 bales of cotton. There were 1,456 horses, 1,473 mules and asses, 2,347 milch cows, 5,300 other cattle, 2,156 sheep, and 16,464 swine. Capital, Halifax.

HALIFAX, a county of Nova Scotia, Canada, bordering on the Atlantic, and drained by Shubenacadie, Musquidoboit, and other rivers;

area, 2,450 sq. m.; pop. in 1871, 56,933, of whom 17,433 were of Irish, 16,409 of English, 9,947 of Scotch, 6,418 of German, 3,044 of French, and 2,188 of African origin or descent. The surface, with the exception of a belt of high broken land, from 20 to 30 m. wide, along the coast, is tolerably level, and is dotted over with lakes. The harbors are exceedingly numerous, and six or seven are spacious enough for ships of the line. A small part of the soil is fertile. Lead and slate are the most valuable minerals. The county is the most populous in Nova Scotia, and the inhabitants are engaged chiefly in commerce, ship building, and the fisheries. Capital, Halifax.

HALIFAX, a city, port of entry, and the capital of Nova Scotia, Canada, and of Halifax co., situated near the middle of the S. E. coast of the province, on the W. side of a deep inlet of the Atlantic called Chebucto bay or Halifax harbor; lat. 44° 39' 42" N., lon. 63° 35' 30" W.; pop. in 1790, 4,000; in 1828, 14,439; in 1861, 25,026; in 1871, 29,582. The city is built on the declivity of a hill rising 236 ft. above the level of the harbor, and, including its suburbs, is about 2½ m. long and 1 m. wide. Its plan is regular, most of the streets crossing one another at right angles; many of them are spacious and handsome. The lower part of the city is occupied by wharves and warehouses, above which rise the dwelling houses and public buildings, while the summit of the eminence is crowned by an edifice in which is fixed the town clock, and by a citadel strongly built of granite. There is little uniformity in the appearance of the houses, some of them being handsomely built of stone or brick, and others, equally attractive, of wood neatly painted, while many are stuccoed or plastered. The province building, in which are the government offices, the legislative chambers, and the city library, is 140 ft. long by 70 ft. broad, with an Ionic colonnade. The government house, admiral's residence, Dalhousie college, military hospital, lunatic asylum, workhouse, jail, penitentiary, city market, post office, theatre, assembly rooms, court house, exchange, and some of the public

schools, are the other most prominent structures. Halifax is the military headquarters of the Dominion of Canada; the troops occupy extensive and handsome barracks at the N. end overlooking the harbor. It is also the chief naval station for British North America, including the West Indies, and has a government dockyard covering 14 acres, situated in the N. portion of the town, which is thoroughly equipped and said to be inferior to few except those of England. By means of the Intercolonial and the Windsor and Annapolis railways, it has communication with Annapolis, Pictou, and St. John, N. B. The harbor of Halifax is one of the best in the world. It extends about 16 m. inland, is accessible at all times, and opposite the city, where vessels usually anchor, is about 1 m. wide. Further up it contracts to $\frac{1}{2}$ m., and finally expands into a beautiful sheet of water called Bedford basin, comprising an area of about 10 sq. m.

more than one half of the exports of the province. Of the exports, \$2,426,980 represent the product of the fisheries. There were 55 vessels built, with an aggregate tonnage of 13,157. The Cunard line of steamers from Liverpool to Boston touches here, and steamers run to various ports of Canada, Newfoundland, the West Indies, and the United States. The manufactures are of considerable importance, embracing iron castings, machinery, agricultural implements, nails, gunpowder, cordage, boots and shoes, soap and candles, leather, tobacco, paper, cotton and woollen goods, wooden ware, &c. There are also several breweries and distilleries, a sugar refinery, six banks, two branch banks, a savings institution, and several gold-mining and other joint stock companies. The streets are lighted with gas, and water is distributed through the city. The assessed value of property in 1870 was \$16,753,872. Halifax is the seat of an asylum for



Province Building, Halifax.

A small arm, branching off from the harbor a short distance below the city, extends inland to within $\frac{1}{2}$ m. of this basin, forming a peninsula on which the city is built. The harbor contains McNab's and three or four smaller islands, has two lighthouses, and is defended by several fortifications of considerable strength. There are two passages into the harbor, one on each side of McNab's island. The western is commanded by Fort George and several batteries; the eastern, which has sufficient depth of water only for small vessels, lies under the guns of a formidable stone fort called Fort Clarence. Halifax is largely interested in the fisheries, and has an extensive foreign and coasting trade. For the year ending June 30, 1872, the entrances were 1,387, with an aggregate tonnage of 363,847; clearances, 1,024, of 290,527 tons. The value of imports was \$10,055,579, and of exports \$4,678,684; being about five sixths of the total imports and

the theological department of the college of the Presbyterian church of the lower provinces of British North America. There are two public libraries, a museum, 4 daily, 5 tri-weekly, and 9 weekly newspapers, 2 bi-weekly and 4 monthly periodicals, a convent, and a young men's Christian association. Halifax is the seat of an Episcopal bishop and a Roman Catholic archbishop, and contains 24 churches. The city was founded in 1749 under the auspices of the earl of Halifax. In 1859 it was visited by a destructive conflagration.

HALIFAX, a town and parliamentary borough of England, in the West riding of Yorkshire, on the Hebble near its junction with the Calder, which is navigable to this point, 36 m. S. W. of York; pop. of the town in 1871, 37,208; of the borough, 65,510. The town is well built, and contains ten churches of the English establishment, all fine structures, All Souls' church, completed in 1861, being among the

the blind, a deaf and dumb institution, and a hospital for the insane, and also contains a dispensary, house of refuge, home for the aged, two orphan asylums, the provincial and city hospital, a naval and a military hospital, the provincial poor asylum, St. Paul's almshouse of industry for girls, and two industrial schools. The educational institutions are numerous, embracing, besides 12 schools, Dalhousie college and university, with 7 professors in the classical and 12 in the medical department; St. Mary's college (Roman Catholic), with 8 professors;

finest in England. There are places of worship for Independents, Baptists, Methodists, Unitarians, and Friends; assembly rooms, a theatre, baths, and many literary, charitable, and educational institutions. The town hall, opened in 1863, was designed by Sir Charles Barry, and completed by his son. The piece hall covers more than two acres, and contains 315 rooms for the storage and sale of merchandise. The people's park is a fine pleasure ground given to the town by Sir Francis Crossley, who in 1868 gave 6,000 guineas for its maintenance. He and his relatives also founded several benevolent institutions, among which is the Crossley orphanage for 400 children, with an



Town Hall, Halifax.

annual income of £3,000. An equestrian statue of Prince Albert was erected in 1864. The town is favorably situated for manufactures and trade, having an abundance of water and coal, and water communication with Hull and Liverpool. The chief manufactures are woolen goods, in which it ranks next after Leeds, Bradford, and Huddersfield, and especially carpets. There are also extensive manufactories of cotton goods, machinery, and chemicals.

HALIFAX, Earl of. See MONTAGUE, CHARLES.

HALIFAX, Marquis of. See SAVILE, GEORGE.

HALIM PASHA. See ABD-EL-HALIM.

HALIOTIDE. See EAR SNELL.

HALL. 1. A N. E. county of Georgia, intersected by the Chattahoochee river, and drained by the sources of the Oconee; area, 540 sq. m.;

pop. in 1870, 9,607, of whom 1,290 were colored. It is hilly, and not remarkably fertile, although there is good soil in the river bottoms. Gold, silver, lead, diamonds, rubies, emeralds, and amethysts have been found. It is traversed by the Atlanta and Richmond Air Line railroad. The chief productions in 1870 were 39,665 bushels of wheat, 212,656 of Indian corn, 20,081 of oats, 3,315 of Irish and 15,315 of sweet potatoes, 14,144 lbs. of tobacco, 62,101 of butter, 110 tons of hay, and 288 bales of cotton. There were 700 horses, 545 mules and asses, 1,386 milch cows, 2,511 other cattle, 5,935 sheep, and 7,523 swine; 6 carriage factories, and 9 flour mills. Capital, Gainesville.

II. A S. E. central county of Nebraska, intersected by Platte river and Prairie creek; area, 576 sq. m.; pop. in 1870, 1,057. The soil is fertile. The valley of the Platte is well wooded, and is said to contain coal. The Union Pacific railroad passes through it. The chief productions in 1870 were 17,781 bushels of wheat, 49,443 of Indian corn, 44,350 of oats, 12,669 of barley, 8,355 of potatoes, and 3,753 tons of hay. The value of live stock was \$105,051. There were 4 flour mills. Capital, Grand Island City.

HALL, a town of Austria, in Tyrol, on the Inn, 10 m. N. E. of Innsbruck; pop. in 1870, 5,022. It has celebrated salt works, which annually produce about 300,000 cwt. The salt, dissolved in water, is conducted through wooden pipes to the works from Mount Salzstock, 5,400 ft. high, 5 m. N. of Hall. There are manufactories of sal ammoniac and chemicals.

HALL, or *Schwäbisch-Hall*, a town of Württemberg, 34 m. N. E. of Stuttgart, on both sides of the Kocher; pop. in 1871, 7,793. It has a fine town hall, two public libraries, an ancient mint, a large number of sugar refineries, and a large trade in salt made in the neighborhood. It was formerly a free imperial city.

HALL, Basil, a British author, born in Edinburgh in 1788, died near Gosport, England, Sept. 11, 1844. He entered the navy in 1802, and in 1816 commanded the brig *Lyra*, which accompanied Lord Amherst to China. He was made post captain in 1817, and from 1820 to 1822 was stationed on the Pacific coast of America. In 1827-'8 he travelled in the United States and Canada, and afterward in various parts of Europe. In the latter part of his life his mind became impaired, and he died in an insane hospital. Besides contributions to scientific periodicals and to the "Encyclopedia Britannica," and minor works of travel, some written in conjunction with others, he published "A Voyage of Discovery to the Western Coast of Corea and the Great Loo Choo Island" (1818); "Extracts from a Journal written in 1820-'22 on the Coasts of Chili, Peru, and Mexico" (2 vols., 1823-'4); "Travels in North America" (3 vols., 1829); "Fragments of Voyages and Travels" (9 vols., 1831-'40); "Spain and the Seat of War in Spain" (1837); and "Patchwork, Travels in Stories" (1840).

HALL, Charles Francis, an American arctic explorer, born at Rochester, N. H., in 1821, died in Greenland, Nov. 8, 1871. A blacksmith by trade, he finally became a journalist in Cincinnati. In 1859 he went to New York, and at a meeting of the geographical society offered to "go in search of the bones of Franklin." Funds amounting to about \$1,200 were raised for this purpose, and in May, 1860, he set out from New London on board a whaling vessel commanded by Capt. Buddington, with whom he was associated in his subsequent expeditions. The whaler having become blocked up by the ice, Hall resolved to make himself acquainted with Esquimaux life. He fell in with two natives, Ebierbing and his wife Tookoolito, who had some years before visited England, where they acquired the English language. They became greatly attached to him, and were his constant companions to the close of his life. Hall remained with the Esquimaux more than two years, acquiring their language and adopting their habits; and although he learned nothing of the fate of Franklin's men, he believed it to be probable that some of them might still survive. He made his way back to the United States in September, 1862, accompanied by Ebierbing and Tookoolito, and devoted the next two years to the preparation of his book, "Arctic Researches, and Life among the Esquimaux" (New York, 1864), and to making arrangements for a new expedition. He set out upon this, July 30, 1864, on board a vessel commanded by Buddington, expecting to be absent about two or three years; but he did not return until late in 1869. He kept a full journal, with the intention of preparing it for the press after he had made one more voyage of discovery; it was never done, and of this expedition only a few fragmentary accounts have appeared. By this time it was clearly ascertained that none of Franklin's men could be living, and Hall labored to induce the government to fit out an adequate expedition, the special object of which should be to reach the supposed open polar sea, and if possible to go to the north pole. Congress having made the requisite appropriation, a steamer was purchased, fitted up for the purpose, and named the *Polaris*. The expedition was placed under the general command of Hall, Buddington going as sailing master. There were also several scientific associates. The *Polaris* sailed from New York June 22, 1871, and on Aug. 22 reached Tessuisak, the most northern settlement in Greenland, whence on the 24th she steamed up Smith sound, and on the 30th reached lat. 82° 16' N., probably the most northern point yet attained. The channel was blocked up by ice, and the *Polaris*, by the advice of Buddington and contrary to the judgment of Hall, turned back, and was laid up for the winter in a sheltered cove, to which the name of *Polaris bay* was given, lat. 81° 38' N. On Oct. 10 Hall with three others started on a sledge expedition, which went within a few miles as far north as the *Polaris* had

reached. He returned on the 24th, and was immediately seized by an illness from which he partially recovered; but a relapse took place, and he died in a few days, probably from apoplexy. There were some suspicions that he had been poisoned, but these do not appear to have been well founded. The command now devolved upon Capt. Buddington. The *Polaris* lay in winter quarters until August, 1872, meantime suffering considerable injury from floating ice. It was then determined to return, and for weeks they tried to work their way through the ice pack. On Oct. 15 the *Polaris* was in imminent peril, and preparations were made to abandon her. The boats were put on the ice, with many stores and 19 of the crew; but before the rest could be landed the vessel broke loose and drifted away, leaving these 19 on the ice, under the charge of Capt. Tyson. They drifted back and forth for 195 days, but generally southward, and were only saved from starvation by the skill of Ebierbing as a seal hunter. This party was picked up, April 30, 1873, by the *Tigress*, a Nova Scotian whaling steamer, in lat. 53° 35' N., having drifted helplessly nearly 2,000 miles. The *Polaris* meanwhile, entirely disabled, found a refuge near Littleton's island, and those who remained built a hut on the shore, where they passed the winter. In the spring they built two boats from the boards of the vessel, in which, early in June, 1873, they set sail southward. The hulk of the *Polaris* was given to a band of Esquimaux; but she afterward drifted away and went down in deep water. This party was picked up, June 23, by a Scottish whaler, and conveyed to Dundee, where they arrived Sept. 18, whence they returned to the United States.—See "Arctic Experiences," edited by E. Vale Blake (New York, 1874).

HALL, Dominick Augustine, an American jurist, born in South Carolina in 1765, died in New Orleans, Dec. 19, 1820. He commenced the practice of law in Charleston. In 1806 he was appointed district judge for Orleans territory, which was formed in 1812 into the state of Louisiana, Hall continuing as a United States judge, with the exception of a few months in 1813, until his death. In March, 1815, New Orleans being under martial law by a proclamation of Gen. Jackson, Judge Hall granted a writ of habeas corpus for the release of Louis Louiallier, who had been arrested on a charge of exciting mutiny among the troops by publishing on Feb. 10 a statement that a treaty of peace had been signed. Jackson, instead of obeying the writ, caused the judge to be arrested. Peace having been proclaimed, Hall summoned Jackson to appear before him to answer a charge of contempt of court, and fined him \$1,000. Jackson paid the fine, which by act of congress was in 1844 refunded with interest.

HALL, Gordon, an American missionary, born at West Granville (now Tolland), Mass., April 8, 1784, died in India, March 20, 1826. He

graduated at Williams college in 1808, studied theology, offered himself as a missionary to the American board, and in 1812 sailed for India, where he passed the remainder of his life. Besides ordinary missionary labor, he revised a translation of the New Testament into the Mahratta language, and published several sermons and tracts, of which the "Appeal in behalf of the Heathen" excited much attention, and in conjunction with S. Newell, "The Conversion of the World" (2d ed., 1818).

HALL, I. James, an American judge and author, born in Philadelphia, Aug. 19, 1793, died near Cincinnati, July 5, 1868. He began the study of law, but joined the army in 1812, and served on the northern frontier. At the close of the war he went with Decatur in his expedition to Algiers. In 1818 he resigned his commission, and resumed the study of the law at Pittsburgh, Pa., and in 1820 removed to Shawneetown, Ill., where he practised at the bar and edited a weekly newspaper. He was soon after appointed public prosecutor for a circuit which included ten counties and was infested by organized bands of counterfeiters, horse thieves, and desperadoes. He held this office four years, when he was elected judge of the circuit court, an office which was abolished three years later. He then became state treasurer, at the same time practising law and editing a newspaper at Vandalia. In 1833 he removed to Cincinnati, where he engaged in financial business and literary labors. Besides his numerous contributions to periodicals, he published "Letters from the West" (originally published in the "Port Folio," then edited by his brother, collected and published in London, 1829); "Legends of the West" (1832); "The Soldier's Bride, and other Tales" (1832); "The Harpe's Head, a Legend of Kentucky" (1833); "Tales of the Border" (1835); "Statistics of the West" (1836; reissued, with additions, as "Notes on the Western States," 1839); "Life of William Henry Harrison" (1836); "History of the Indian Tribes" (3 vols. fol., 1838-'44, written in conjunction with Thomas L. McKenney, and illustrated with 120 portraits of Indian chiefs, the price being \$120); "The Wilderness and the War Path" (1845); "Life of Thomas Posey, Governor of Indiana" (in Sparks's "American Biography," 1846); and "Romance of Western History" (1857). A uniform edition of his works has been published (4 vols., 1853-'6). **II. John E.**, an American author, brother of the preceding, born in December, 1783, died June 11, 1829. He graduated at Princeton college, studied law, and in 1805 commenced practice in Baltimore, but soon after became professor of rhetoric and belles-lettres in the university of Maryland. He was severely wounded in the Baltimore riots of 1811, and was one of the nine thrown into a heap as dead. He edited "The Practice and Jurisprudence of the Court of Admiralty" (1809), and "The American Law Journal" (1808-'17). Having removed to Philadelphia,

he was editor of the "Port Folio" from 1817 to 1827, edited "The Philadelphia Souvenir" (1827), and published "Memoirs of Eminent Persons" (1827).

HALL, James, an American geologist and palæontologist, born at Hingham, Mass., of English parents, Sept. 12, 1811. Destined at first for the medical profession, he soon turned his attention to natural history, which he pursued from 1831 to 1836, under Amos Eaton, in the Rensselaer polytechnic institute, Troy, N. Y., where he has since been for many years professor of geology. Being appointed one of the geologists for the survey of New York, he began in 1837 his explorations of the western district of the state. He published annual reports from 1838 to 1841, and gave in 1843 his final report in a large quarto volume, which forms one of the series of works on the natural history of New York published by the legislature. In this volume he described in a very complete and exhaustive manner the order and succession of the strata, their mineralogical and lithological characters, and the organic remains which they contain. The field work of the survey being then completed, he was appointed palæontologist to the state, and charged with the work of studying and describing the organic remains of the rocks. He still holds this post (1874), and has embodied the results of his studies in the "Palæontology of New York," one of the most remarkable monuments of scientific labor, zeal, and industry which this country has produced. It is as yet incomplete, but some idea of its extent may be given by an account of the volumes already published and those now in progress. Beginning with the lowest member of the New York system of palæozoic rocks, the first volume of the "Palæontology" (338 pp. 4to, with 100 plates, 1847) contains descriptions of all the organic remains, both of plants and animals, up to the summit of the so-called Champlain division of the system, which terminates in the Hudson river group, corresponding to the Cambrian of Sedgwick or the Cambrian and lower Silurian of Murchison. The second volume (362 pp., with over 100 plates, 1852) continues the subject up to the base of the Onondaga or Salina formation. The third volume (533 pp., with 128 plates, 1859) includes all the fossil remains of the water lime, the lower Helderberg, and Oriskany divisions, except the corals and bryozoa. The fourth (the same, 1867) includes the brachiopoda of the divisions known as the upper Helderberg, Hamilton, Portage, and Chemung, making together the Erian or Devonian. The fifth volume, now in progress (1874), will contain the lamellibranchiata of the last named divisions, besides a review of all the lamellibranchiate forms from the lower formations. The drawings and descriptions for two more volumes are also far advanced, including the gasteropoda, cephalopoda, and crustacea of the Erian, with the crinoidea, bryozoa, and corals of the same. In addition to

these, Prof. Hall has prepared for the "Palæontology" a complete revision of the palæozoic brachiopoda of North America, with about 50 plates. This great and comprehensive study of our palæozoic fauna, which it is proposed to terminate with the base of the coal formation, has demanded researches beyond the limits of New York; and Prof. Hall has extended his investigations westward to the Rocky mountains, tracing out over the region the great divisions of the New York series. It is these identifications which have served as the basis of all our knowledge of the geology of the Mississippi basin. The general results of these comparative studies will be found in the introduction to the third volume of the "Palæontology," and more fully in the first volume of the "Report on the Geology of Iowa." Having been in 1855 appointed geologist to this state, he published in 1858, in connection with Whitney and Worthen, a report in two volumes, to which, besides the geological researches just mentioned, he contributed a memoir on the palæontology of the state, with 34 plates. He subsequently performed for Wisconsin a similar service, the results of which are as yet but partly published. Prof. Hall was about this time called to take charge of the palæontology of the geological survey of Canada under Sir William Logan. This he declined, but undertook the study of the graptolites of the so-called Quebec group of Canada, which appeared in 1865 as an exhaustive monograph, with 22 plates. This work was subsequently republished by him, with additions, in the 20th report of the New York state cabinet of natural history. Various other contributions to palæontology by him will be found in most of the reports of the state cabinet and state museum, from No. 3 to No. 25. To these must be added the description of the organic remains given in the government reports of various western surveys, including the reports of Fremont, Stansbury, and the United States and Mexico boundary survey. Besides all these are numerous communications to the "American Journal of Science," and to various scientific societies and academies both at home and abroad, including the geological society of London, of which he is one of the foreign members, and which in 1858 gave him the Wollaston medal. Prof. Hall has also devoted much time to the study of crystalline stratified rocks, and was the first to point out the persistence and the significance of mineralogical character as a guide to their classification, in the manner which has since been developed and extended by Hunt. (See GEOLOGY.) While devoting himself to the study of the minute details of organic structures, and discriminating between and classifying these with the utmost precision, Prof. Hall has also successfully traced out and arranged in their true order, over vast areas of North America, the formations to which they belong; thus doing for the stratigraphical geology of our country a work second in importance

only to that which he has done for its palæontology. Carrying his investigations still further, he has attempted the solution of some of the most difficult questions of dynamical geology, and has laid the grounds for a rational theory of mountains which must be regarded as one of his most important contributions to geological science. (See MOUNTAIN.)—In his earlier palæontological publications Prof. Hall was greatly aided by his wife, who drew the figures of a large portion of the fossils. One of his sons, CHARLES EDWARD, is now (1874) engaged in geological investigations in Texas.

HALL, John, an American clergyman, born in the county Armagh, Ireland, July 31, 1829. He entered Belfast college when he was only 13 years old, and, notwithstanding his extreme youth, was repeatedly Hebrew prize man. He was licensed to preach at the age of 20, and at once engaged in labor as a missionary in the west of Ireland. In 1852 he was installed pastor of the first Presbyterian church at Armagh, and in 1858 he was called to the church of Mary's Abbey, now Rutland square, in Dublin. He was an earnest friend of popular education, and received from the queen the honorary appointment of commissioner of education for Ireland. In 1867 he was a delegate from the general assembly of the Presbyterian church in Ireland to the Presbyterian churches of the United States. After his return to Ireland he received by the telegraph cable a call to the Fifth Avenue Presbyterian church in New York, which he accepted, entering upon his labors on Nov. 3, 1867. The church edifice having become insufficient for his congregation, they are now (1874) building for him, at a cost of about \$900,000, a church which when completed will be the largest Presbyterian church in New York, if not in the world. Dr. Hall is often called to preach in other cities at the installation of clergymen, the dedication of churches, &c.; and he was selected to preach the funeral sermon of Chief Justice Chase, who belonged to a different denomination. He has published "Family Prayers for Four Weeks" (1868), "Papers for Home Reading" (1871), and "Questions of the Day" (1873). Dr. Hall is universally regarded as an earnest and eloquent preacher; and though he speaks extemporaneously, his sermons bear marks of great refinement and finish.

HALL, Joseph, an English author, born at Ashby de la Zouch, July 1, 1574, died at Higham, Sept. 8, 1656. He was educated at Cambridge, took orders, and became dean of Worcester in 1617, bishop of Exeter in 1627, and bishop of Norwich in 1641. In the latter year he joined with the bishops who protested against the validity of laws made during their forced absence from parliament, and was committed for a time to the tower. In 1643 his revenues were sequestered and his personal property was pillaged. From 1647 to his death he lived in poverty at Higham, near Norwich. Among his prose writings are: *Mundus alter et idem*

(1607; translated into English by John Healey under the title "Discovery of a new World, or a Description of South Indies hitherto unknown," London, without date); "Contemplations on the Old and New Testaments;" "Paraphrases on Hard Texts;" "Epistles," and several volumes of sermons and devotional and polemical works. His satires, "Virgidemiarum, six Bookes" (1597-'8), have been highly praised by Pope, Warton, and Campbell, and disparaged by Hallam. An edition of his works has been published, with an autobiography, and notes by Josiah Pratt (10 vols., London, 1808), and a later and better one by Peter Hall (12 vols., Oxford, 1837-'9).

HALL, Lyman, one of the signers of the Declaration of Independence, born in Connecticut in 1725, died in Burke co., Ga., Oct. 19, 1790. He graduated at Yale college in 1747, studied medicine, and removed in 1752 to South Carolina, and the same year to Sunbury, Ga., where he engaged in the practice of his profession. At the opening of the revolution he was influential in inducing Georgia to join the confederacy. In 1775 he was chosen a member of congress, and was annually reelected till 1780. Georgia had in the mean time fallen under the power of the British, who confiscated all his property. He was elected governor of Georgia in 1783, and served for one term; after which he retired from public life.

HALL, Marshall, an English physician, born at Basford, Nottinghamshire, in 1790, died in Brighton, Aug. 11, 1857. At the age of 19 he went to the university of Edinburgh and studied medicine and chemistry. In the latter department he pointed out the distinction between all chemical bodies, which ruled their chemical affinities, caused by the presence or absence of oxygen. From his study at this time of morbid anatomy in close connection with clinical medicine resulted his "Treatise on Diagnosis." Having taken his degree of M. D. in 1812, he was for two years house physician at the royal infirmary in Edinburgh, then visited the medical schools of Paris, Berlin, and Göttingen, and settled in Nottingham in 1815. He soon obtained a large practice, was appointed physician to the general hospital of the city, and became a valuable contributor to the literature of his profession. His "Treatise on Diagnosis" (1817) has in the main stood the test of 60 years' trial. "Commentaries on various Diseases peculiar to Women" (1827) is still a standard book of reference. In 1826 he removed to London, where he prosecuted his researches. In 1853-'4 he visited the United States, Canada, and Cuba, and published "The Twofold Slavery of the United States." Among his most important discoveries is the method now known by his name for treating asphyxia. (See *Drowning*.) In addition to the works already mentioned, he published "Principles of the Theory and Practice of Medicine" (London, 1837);

"Observations and Suggestions in Medicine" (2 vols. 8vo); and several important treatises on the nervous system.

HALL, Newman, an English clergyman, born in 1816. He studied at Totteridge and at Highbury college, and took the degree of A. B. at the London university; and in 1855 he took that of LL.B. and won the law scholarship. In 1842 he became minister of the Albion Congregational church, Hull. In 1854 he removed to London, where he became pastor of Surrey chapel, Blackfriars road, known as Rowland Hill's chapel. In 1850 he opposed the general cry against what was called papal aggression. After the close of the American civil war, during which he had advocated the cause of the Union, he visited the United States, spoke frequently in the interest of international friendship, and preached before congress. In 1866 he was elected chairman of the Congregational union. He has been an earnest advocate of total abstinence, and has established at his chapel weekly lectures on secular subjects for the common people. Although he is a non-conformist, he uses the liturgical service of the church of England. He again visited the United States in 1873, and lectured in several cities. He has published "The Christian Philosopher," an account of the death of William Gordon (London, 1849); "The Land of the Forum and the Vatican" (1853); "Lectures in America" (New York, 1868); "Sermons, and History of Surrey Chapel" (1868); "From Liverpool to St. Louis" (London, 1869); and "Pilgrim Songs," a volume of devotional poetry (1871). He has also published a number of tracts on temperance and religious subjects, of one of which, entitled "Come to Jesus," more than 1,500,000 copies have been printed in England, and it has been translated into about 30 languages. Most of his works have been republished and widely circulated in the United States. He has also edited the autobiography of his father, John Vine Hall.

HALL, Robert, an English preacher, born at Arnsby, Leicestershire, May 2, 1764, died in Bristol, Feb. 21, 1831. While still a boy his favorite works were Edwards' "On the Will" and Butler's "Analogy," which he was able to analyze and intelligently discuss at 9 years of age. When he was 11 years old his master informed his father that he was entirely unable to keep up with his young pupil. At 16 he entered the university of Aberdeen, where he became the friend of Mackintosh, who says that he was "fascinated by the brilliancy and acumen of Hall, in love with his cordiality and ardor, and awe-struck by the transparency of his conduct and the purity of his principles," and that "from his discussions with him he learned more as to principle than from all the books he ever read." In 1783, while still continuing his studies at Aberdeen, he became assistant pastor of Broadmead church in Bristol. In 1790 he removed to Cambridge, where he became pastor of the Baptist church, and rose

at once to the highest rank of British preachers. In Cambridge some of his principal pamphlets were published, including "Christianity consistent with the Love of Freedom" (1791), "Apology for the Freedom of the Press" (1793), his far-famed sermon on "Modern Infidelity" (1800), "Reflections on War" (1802), and "Sentiments suitable to the Present Crisis" (1803). These publications were called forth by the French revolution. In 1804 he became temporarily insane, and was obliged to resign his charge at Cambridge. Upon his recovery he married, and in 1808 was settled at Leicester, and in 1826 was recalled to the church in Bristol, the scene of his early labors, where he remained until compelled by disease to relinquish his post. No man in modern times has held a higher rank as a pulpit orator. For nearly all his life he was afflicted with a mysterious disease, from which he suffered so intensely that for more than 20 years he was never able to pass an entire night in bed, and was often obliged in a single night to take 1,000 drops of laudanum. On examination after death it was found that the source of his sufferings was a rough-pointed calculus that entirely filled the right kidney. His physician said: "Probably no man ever went through more physical suffering than Mr. Hall; he was a fine example of the triumph of the higher powers of mind, enabled by religion, over the infirmities of the body." His works, edited, with a memoir, by Olinthus Gregory, have been published in 6 vols. 8vo (London, 1831-'3; several times reprinted).

HALL. I. Samuel Carter, an English author and editor, born at Topsham, Devonshire, in 1800. He studied law, and was called to the bar, but devoted himself to literature, was some time a parliamentary reporter, succeeded Campbell as editor of the "New Monthly Magazine," and, partly in conjunction with his wife, wrote and edited many annuals and other illustrated books. In 1839 he became editor of the "Art Journal." Apart from editorial labor, he has published accounts of the industrial exhibitions of London, 1851, and of Paris, 1857; "A Book of Memories of Great Men and Great Women of the Age" (London, 1870); and "The Trial of Sir Jasper" (1873), a poem on the evils of intemperance, which had a great success, and of which a drawing-room edition, beautifully illustrated, was issued in 1874. **II. Anna Maria Fielding**, wife of the preceding, born in Dublin in 1805. When about 15 years of age she went to London, and was soon after married to Mr. Hall, with whom she entered upon a long career of literary labor. The illustrated work on "Ireland" (3 vols., London, 1841-'3) is the best of their joint works, the larger share being hers. She has also published many volumes of novels, tales, and sketches, among which are: "Sketches of Irish Character" (1829); "The Buccaneer" (1832); "Lights and Shadows of Irish Life" (1838); "Tales

of the Irish Peasantry" (1840); "Marian" (1840); "Midsummer Eve" (1847); "Pilgrimages to English Shrines" (1850); and "Popular Tales and Sketches" (1856). Two of her dramas, "The French Refugee" and "The Groves of Blarney," have been successful on the stage.

HALLAM. I. Henry, an English historian, born in Windsor in 1777, died in Penshurst, Kent, Jan. 21, 1859. His father was dean of Bristol, and he was educated at Eton and at Oxford, and studied law, but did not practise. He engaged in literary pursuits in London, and his contributions to the "Edinburgh Review" soon brought him into notice and gave him a position among the best writers of the day. In 1818 he published his "View of the State of Europe during the Middle Ages" (2 vols. 4to), in which he presented in a series of dissertations, remarkable for research and learning, a comprehensive survey of the chief subjects of interest in those times. His intention was to continue this work, which became at once a standard treatise, down to about the middle of the last century; but finding that it would be a labor beyond his strength, he satisfied himself with a continuation of the history of the British constitution from the point where he left it in the eighth chapter, and in 1827 published "The Constitutional History of England from the Accession of Henry VII. to the Death of George II." (2 vols. 4to). This work possessed the characteristic merits of the first, patient research, accuracy of statement, impartiality, and liberal principles; but as it covered a period nearer our own times and touched the roots of existing controversies, it did not command the same general assent. It is now regarded as in the main an accurate deduction and a fair statement of the principles of the British constitution. After another interval he published his last great work, the "Introduction to the Literature of Europe in the 15th, 16th, and 17th Centuries" (4 vols. 8vo, 1837-'9). The preface contains a comprehensive survey of what had been done before his time in the same department, and establishes his claim to have led the way among English writers in a general survey of literary history. In 1848 he published a supplemental volume to his work on the middle ages, in which he gave in a series of annotations the result of his studies during the 30 years that had elapsed since the original publication. These works have passed through numerous editions, and have been translated into the principal languages of Europe. In 1852 he published a volume entitled "Literary Essays and Characters." **II. Arthur Henry**, son of the preceding, born in London, Feb. 1, 1811, died in Vienna, Sept. 15, 1833. He studied at Eton and at Trinity college, Cambridge, where he graduated in 1832, and in the same year entered the Inner Temple. In August, 1833, he accompanied his father to the continent, where he contracted a fatal illness. He left a number of poems and essays, which were collected by

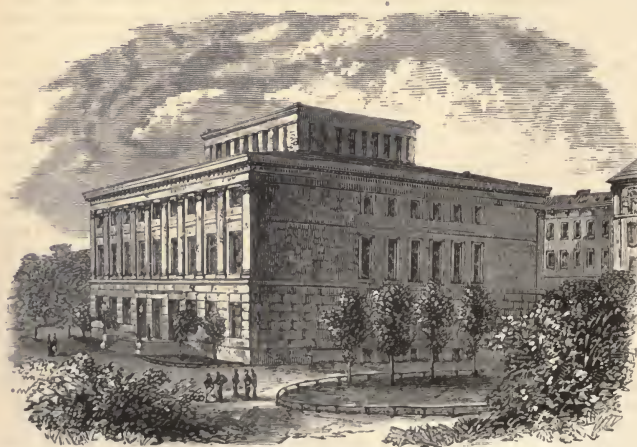
his father and printed with a memoir for private circulation (London, 1834). His "Remains in Verse and Prose" was published in 1862. He was betrothed to a sister of Tennyson, who made him the subject of his "In Memoriam."

HALLE, a city of Prussian Saxony, on the right bank of the Saale, 20 m. N. W. of Leipzig; pop. in 1871, 52,639. It consists of Halle proper with five suburbs, and of the two ancient towns of Glaucha and Neumarkt. The streets, except in some modern parts, are generally crooked, narrow, and badly paved. The principal public buildings are the church of St. Mary, with four towers, built in the Gothic style about the middle of the 16th century, to which belong a library of 20,000 volumes and the so-called red tower on the market place; that of St. Maurice, also built in the Gothic style, and that of St. Ulrich; the cathedral, the city hall, the ruins of the castle of Moritzburg, anciently a residence of the archbishops of Magdeburg, the university, and the Francke institutions in the suburb of Glaucha. The university, which was founded in 1694 by the elector (afterward king) Frederick, and in 1815, after having been closed by Napoleon in 1806 and 1813, united with that of Wittenberg, was most flourishing in the beginning of this century, and counted many eminent men among its professors. There were 1,300 students in 1829, but subsequently the number declined to less than 600. In 1873, however, the number had again increased to 1,073. Among the institutions more or less closely connected with the university are a normal, philological, and theological seminary, an academy of the natu-

factories of woollen and linen goods, stockings, gloves, silk buttons, hardware, leather, and starch, and an active commerce. The extensive salt works in the city belong to a company, and those outside of it to the government. The persons employed in the latter are known as the *Halloren*, and were long supposed to be of Slavic origin, but are now regarded either as Celts or as descendants of the earliest Frankish settlers.—Halle is first mentioned, as the castle of Halla, under Charlemagne. Otho the Great gave it to the archbishop of Magdeburg, and Otho II. erected it into a city in 981. It became so powerful in the course of time as to contend in the 13th century, often successfully, with its feudal lords, and to resist in 1435 a large army under the elector of Saxony. The reformation was introduced here in its earliest period. The city suffered greatly during the thirty years' war, and came in 1648 into the possession of the house of Brandenburg by the peace of Westphalia. Handel was born here.

HALLECK, Fitz-Greene, an American poet, born at Guilford, Conn., July 8, 1790, died there, Nov. 17, 1867. He received his education at the grammar school of his native town, and became clerk in a store at Guilford. In 1811 he entered the banking house of Jacob Barker in New York, in which employment he remained for many years. For 16 years previous to the death of John Jacob Astor he was engaged in his business affairs, was named by him as one of the original trustees of the Astor library, and by his will received an annuity of \$200. In 1849, having as he said "been made rich with 40 pounds a year," he retired to

Guilford, to live with an unmarried sister. He wrote verses in his boyhood, some of which appeared anonymously in contemporary newspapers. The lines to "Twilight," the first in date of his collected poems, appeared in the "New York Evening Post" in 1818; and in March, 1819, he formed a literary partnership with Joseph Rodman Drake to write the "Croaker" papers, which appeared in the same journal from March to June, 1819. Drake's death in the summer of 1820 was commemorated by Halleck in one of his most



University of Halle.

ral sciences, a medical and surgical clinical institute, a school of midwifery, an anatomical theatre, a botanical garden, an observatory, and a library of 100,000 volumes. The Francke institutions comprise an orphan asylum, several schools, and a printing press. Halle has manu-

touching poems. In the latter part of 1819 he wrote his longest poem, "Fanny," a satire on the fashions, follies, and public characters of the day. It was completed within three weeks of its commencement, and from the variety and pungency of its local and personal allu-

sions enjoyed a great popularity, copies having been circulated in manuscript after the original edition had been exhausted. In 1821 a second edition appeared, enlarged by the addition of 50 stanzas. In 1822-'3 he visited Europe, and in 1827 published anonymously an edition of his poems, including "Alnwick Castle," "Burns," and "Marco Bozzaris." In January, 1864, he published in the "New York Ledger" "Young America," a poem of about 300 lines. Enlarged editions of Halleck's poems appeared in 1836, 1842, 1849, and 1858, and after his death a complete edition, including the "Croakers" and "Young America," edited with very full notes by James Grant Wilson, who has also written the "Life of Halleck." In 1832 Halleck prepared an edition of Byron, containing notes and a memoir; and in 1840 he compiled two volumes of "Selections from the British Poets." A handsome obelisk has been erected over his grave at Guilford, and a full-length bronze statue is to be erected in the Central park, New York.

HALLECK, Henry Wager, an American soldier, born at Waterville, N. Y., Jan. 15, 1815, died in Louisville, Ky., Jan. 9, 1872. He studied for a time at Union college, and entered the military academy at West Point, where he graduated in 1839, after which he served for a year as assistant professor of engineering, and until 1845 as assistant engineer upon the fortifications in the harbor of New York. In that year he was sent by government to study the principal military establishments in Europe. In 1846 he was ordered to California, where he served in various military and civil capacities, and was also director general of the New Almaden quicksilver mines. He resigned his commission in August, 1854, and entered upon the practice of law in San Francisco, and was also president of a railroad. On the outbreak of the civil war he was appointed a major general in the United States army, and was soon after placed in command of the military department of the West, his headquarters being at St. Louis. He directed the military operations in the west, and took the command in the field during the Corinth campaign in the spring and early summer of 1862. In July, 1862, he was called to Washington and appointed general-in-chief of all the armies of the United States, a position which he held till March 12, 1864. Grant being then made lieutenant general, Halleck received the appointment of chief of staff to the army, which he held till April, 1865, when he was placed in command of the military division of the James, his headquarters being at Richmond. In the following August he was transferred to the division of the Pacific, and in March, 1869, to that of the South, his headquarters being at Louisville. He published several works upon military and scientific topics, the principal of which are: "Bitumen, its Varieties, Properties, and Uses" (1841); "Elements of Military Art and Science" (1846; 2d ed., with critical notes on

the Mexican and Crimean wars, 1858); "The Mining Laws of Spain and Mexico" (1859); a translation, with an introduction, of "De Fooz on the Law of Mines" (1860); "International Law, or the Rules regulating the Intercourse of States in Peace and War" (1861); a translation, with notes, of Jomini's "Life of Napoleon" (1864); and "A Treatise on International Law and the Laws of War, prepared for the Use of Schools and Colleges" (1866).

HALLEIN, a town of Austria, in the duchy of Salzburg, near the Bavarian frontier, on the Salzach, 9 m. S. of Salzburg; pop. about 3,600. The neighboring mountains are rich in salt mines, of which there is here a government inspection. There are 17 entrances to the mines, which are very extensive, reaching some distance beyond the Bavarian frontier, the right of working them being guaranteed to Austria by the treaty of Vienna. The mines have been worked for more than 600 years, and still produce over 16,000 tons of salt annually. The town contains salt baths and extensive manufactories of cotton goods and wooden ware. The Tyrolese, under Hapsinger, here encountered the French, under Lefebvre, Oct. 3, 1809.

HALLER, Albrecht von, a Swiss physiologist, born in Bern, Oct. 16, 1708, died there, Dec. 12, 1777. He studied theology at Tübingen, and medicine and natural sciences at Leyden, where he graduated in 1726. After having paid a prolonged visit to England and France, he studied the higher branches of mathematics in Basel under Bernoulli. His delicate health induced him to accompany his friend Johann Gessner to the Alps, where he gathered the materials for his great botanical work and one of his poems. In 1729 he returned to Bern, where he founded an anatomical theatre. In 1735 he was appointed physician of the city hospital and director of the city library, and in the following year professor of botany, medicine, surgery, and anatomy at the newly established university of Göttingen. He founded there many scientific and beneficent institutions, and in 1751 the royal academy of sciences, of which he became president for life. He was ennobled by the emperor Francis I., received complimentary invitations from Oxford, Utrecht, Halle, Berlin, and St. Petersburg, was appointed royal councillor and physician by the king of England, and member of the grand council of Halle. In 1753 he relinquished all his trusts, excepting the presidency of the royal academy, and spent the rest of his life in Bern, where he became chief magistrate.—Haller is regarded as the father of modern physiology. He established scientifically a new law, referring the animal functions to two powers, irritability and sensibility. He had evolved this idea as early as 1739, and announced it in 1747, in his *Prima Lineæ Physiologiæ*, and expounded his system in its entire comprehensiveness in his *Elementa Physiologiæ Corporis Humani* (8 vols., Lausanne, 1757-'66, with a posthumous supplement, 1782). Among his other works are *Bibliotheca*

Botanica (2 vols., Zürich, 1771-'2), *Bibliotheca Chirurgica* (2 vols., 1774-'5), *Bibliotheca Anatomica* (2 vols., 1774-'7), and the first part of the *Bibliotheca Medicina Practica* (4 vols., Basel, 1776-'87). His *Icones Anatomicae* (7 vols., Göttingen, 1743-'6), which he himself regarded as one of his best works, contains 46 drawings of many of the organs, and particularly of the arteries. His activity was prodigious. Besides numerous contributions to German and French scientific periodicals, he wrote 12,000 reviews for the *Commentarii Societatis Regiae Scientiarum Gottingensis*, and many novels. His best poems are "The Alps" and "On the Origin of Evil."

HALLEY, Edmund, an English astronomer, born at Haggerston, near London, Oct. 29, 1656, died at Lee, near Greenwich, Jan. 14, 1742. He was educated at Oxford. His first published essay was "A Direct and Geometrical Method of finding the Aphelia and Eccentricity of Planets" (1675). In November, 1676, he sailed for St. Helena, to form a catalogue of the fixed stars of the southern hemisphere; he returned in 1678, and the next year published his *Catalogus Stellarum Australium*, containing the positions of 360 stars, and numerous other observations. In 1678 he was elected a fellow of the royal society, and in 1679, at the request of that society, went to Dantzic to settle an astronomical controversy between Hooke and Hevelius. In 1681 he set out on a continental tour, and in December, when near Paris, he discovered the comet known by his name; his prediction of its return was the first of the kind that proved correct. In 1683 he published his "Theory of the Variation of the Magnetic Compass," in which he considers the earth as a vast magnet, having four magnetic poles, two near its N. and two near its S. pole, the needle always being governed by the nearest. In the same year he was led to examine Kepler's laws of the planetary motions, and from them to infer that the centripetal force always varies inversely as the square of the distance. Visiting Newton at Cambridge, to obtain aid in proving this geometrically, he was delighted to find that the latter had perfectly demonstrated the laws of the celestial motions. He soon gave to the royal society an account of Newton's treatise *De Motu*, which was entered on their register; and at a later period he prevailed on the great philosopher to complete his *Principia*, the first volume of which was printed by Halley at his own expense. In 1686 he published an account of the trade winds and monsoons near the tropics; and among other valuable papers were one in 1691 on the circulation of watery vapors and the origin of springs, and another showing the importance of observing the conjunctions of the superior planets, as a means of determining the sun's parallax and distance from the earth. In the same year he was a candidate for the Savilian chair of astronomy at Oxford, but failed to obtain it mainly on

account of what were regarded as his infidel opinions, though it is now said that the only ground for this charge was, that he asserted the existence of a pre-Adamite earth, out of the ruins of which our present earth was made. In 1692 he published his modified theory of the changes in the magnetic variation, and to test its correctness by observation obtained from King William the appointment of captain of a vessel, in which in two successive voyages he finished his experiments; returning home in 1700, he published his chart of the compass variations, and received the title of captain in the royal navy, with half pay for life. On the recommendation of Queen Anne, and at the request of the emperor of Germany, he went twice to the Adriatic to plan the formation of a harbor. In 1703, on the death of Dr. Wallis, he was chosen Savilian professor of geometry at Oxford. Soon after he began, with Gregory, the publication of the works of the ancient geometers; and several of their treatises, translated and edited by them, appeared in 1706-'10. In 1720, after the death of Flamsteed, he was appointed astronomer royal; and though now 64 years of age, he continued for 20 years, without an assistant, to carry on the operations of the Greenwich observatory. In 1721 he published his method of finding the longitude at sea; and in 1725 drew up his tables for computing the places of the planets, which, however, as he delayed publishing that he might perfect them, did not appear till 1749, after his death. In 1737 he was struck with paralysis.

HALLIWELL, James Orchard, an English archaeologist, born at Chelsea, June 21, 1820. He has edited and published more than 60 pamphlets relating to early English literature, especially as connected with Shakespeare. Of his other works, the principal are: "Early History of Freemasonry in England" (1844); "Letters of the Kings of England" (1846); "Dictionary of Archaic and Provincial Words" (2 vols., 1847); "Life of William Shakespeare" (1848); "Popular Rhymes and Nursery Ballads" (1849); "Curiosities of Modern Shakespearian Criticism" (1853); "Notes of Family Excursions in North Wales" (1860); "Rambles in Western Cornwall" (1861); "The Last Days of William Shakespeare" (1863); "An Account of New Place, Stratford-on-Avon" (1864); and an edition of Shakespeare, published for subscribers, of which only 150 copies were printed (16 vols. fol., completed in 1865).

HALLOWELL, a city of Kennebec co., Maine, on the W. bank of the Kennebec river, and on the Augusta division of the Maine Central railroad, 2 m. below Augusta, and 4 m. above Gardiner; pop. in 1860, 2,435; in 1870, 3,007. It is built on rising ground, the principal avenues running parallel to the river, and the cross streets having an ascent of about 200 ft. from the water's edge to the crest of the hill. The upper part of the city is occupied by residences, the lower by stores, factories, and warehouses.

Hallowell is at the head of ocean steamboat navigation, and the wharves are accessible by vessels of 9 ft. draught. Excellent granite is obtained in the neighborhood. It contains a cotton mill, two iron foundries, several granite works, marble works, three tanning and currying establishments, and manufactories of boots and shoes, bricks, cabinet ware, candles, carriages, floor oil cloth, lumber, machinery, putty and whiting, soap and potash, trunks, &c. There are two halls, including the city hall, a hotel, two national banks, a savings bank, a classical school, 13 public schools (including a high school), a free library of 5,000 volumes, and six churches.—Hallowell was permanently settled soon after the erection of Fort Western in 1754 on the site of the present city, although a few traders or colonists resided there a century earlier. It was incorporated as a town in 1771, at which time it included Augusta, Chelsea, the greater part of Manchester, and a portion of Farmingdale and Gardiner. A city charter was adopted in 1852.

HALLOW EVE, *Hallowmas Eve*, or in Scotland *Halloween*, the vigil of All Hallows or All Saints' day, Oct. 31. It has always been the occasion of certain popular usages in Christian countries, such as the performance of spells by young people to discover their future partners for life, and certain fireside revelries, as cracking nuts and ducking for apples. Halloween is thought to be a night when witches, devils, and other mischief-making beings are all abroad on their baneful midnight errands; particularly the fairies are said on that night to hold a grand anniversary. Burns's poem "Halloween" describes the superstitious customs and beliefs of the Scottish peasantry concerning this festival. (See ALL SAINTS' DAY.)

HALO (Gr. *άλω*, a threshing floor, originally of a round shape), a term commonly used in meteorology to include all those phenomena in which a luminous ring, either colored or uncolored, is seen around the disk of the sun or moon. There are two distinct classes of such phenomena, called coronæ and halos, and it is only for convenience that the latter term is sometimes used to include them all. Here we shall consider them under their several heads. The meteorologist Kaemtz includes under the term coronæ all cases in which, when the sky is covered with light clouds, colored circles are seen surrounding the sun or moon; also when a glory is seen around the observer's shadow on a cloud. Under the head "halos properly so called," he includes the great circles which surround the sun or moon, the diameter of which amounts to about 44°. The attendants of halos are: 1, circles having a double diameter; 2, parhelia or mock suns; and 3, various other circles. Coronæ are distinguished from halos in this fundamental respect, that the former are due to particles or vesicles of water in mist or cloud, the latter to minute crystals of ice.—*Coronæ*. All clouds which are not too dense to prevent the light of the sun or moon

from passing through, produce coronæ of greater or less intensity and regularity. When the clouds are irregular in outline, the coronæ are incomplete. When the corona is complete, the following arrangement of colors can be recognized. Close by the sun a dark blue circle can be perceived, next a white circle, and then a red; outside the series there can be seen under favorable conditions a second series, consisting of colored circles in the following order, proceeding eastward from the sun: purple, blue, green, pale yellow, and red. "More frequently," says Kaemtz, "we observe near the sun blue mingled with white, then a red circle clearly limited within, but confused outside with the others. If a second red circle exists outside this, then green is observed in the interval by which they are separated. The distance of this circle from the centre of the sun varies according to the state of the clouds and the atmosphere; I have found it from 1° to 4°." The rings of coronæ, the colors of which are those of the reflected series in thin plates, are fringes due to interference of rays which have undergone diffraction by grazing on either side of numerous minute globules of cloud or fog, that have for the time nearly the same size. An illustrative instance was first given by Necker of Geneva. When the sun rises behind a hill covered with trees or brushwood, a spectator in the shadow of the hill sees all the small branches that are nearly in the line of the solar rays, on either side, projected on the sky, not black and opaque, but white and brilliant, as if of silver; the effect of a small opaque body on the light being, in this class of cases, equivalent to that of a small opening in a dark body through which the rays should penetrate. Coronæ exist around the sun more frequently than would be supposed; but they are often not observed, on account of the brilliancy of that orb. At such times they may be detected by looking at the reflection of the sun in still water, or in black glass.—*Anthelia*. When the sun is near the horizon, and the shadow of the observer falls on any surface covered with dew, there can be perceived a glory especially round the head of the shadow. Anthelia are also seen, and more perfectly, when the observer's shadow falls on or near clouds that lie opposite the sun; or in polar regions when the shadow is cast horizontally upon a fog. Bouguer was the first to observe the phenomenon. He noticed that the shadow of his head, on clouds among the Andes, was encircled by three colored rings having diameters of 5½°, 11°, and 17°. Scoresby, who observed the phenomenon in polar regions, saw four concentric circles round the shadow of his head: the first was white, yellow, red, and purple, and had a semi-diameter of 1° 45'; the second was blue, green, yellow, red, and purple, and had a semi-diameter of 4° 45'; the third was green, whitish, yellowish, red, and purple, and had a semi-diameter of 6° 30'; the fourth was greenish,

white, and deeper at the edges, and the semi-diameter of its internal edge was $36^{\circ} 50'$, that of its external edge being from 41° to 52° . This fourth circle, commonly called the circle of Ulloa, or the white rainbow, is very seldom seen. Anthelia are explained upon the same principle as coronæ, with the single exception that the diffraction in this instance does not occur during the direct transmission of the solar beams through the cloud, but during the retrograde transmission of rays which, having penetrated to considerable depth in the cloud, undergo reflection, and are then diffracted by nearer globules while on their return to the eye.—*Halos proper.* In the commoner forms, one or two rings, formed in the thin, feathery cloud overspreading the sky at a great height, extend vertically about the sun or moon. The diameters of these vary somewhat, and sometimes during the same display; but when one only is seen, its distance from the sun is very near $22\frac{1}{2}^{\circ}$, or diameter 45° ; the latter number being also the radius or distance of the second, when seen. Of these rings, the color of the inner border, when obvious, is almost invariably red; next to this comes green or blue; the outer edge is one of the latter colors, violet, or white. Very rarely the outer border is red. The breadth is usually slightly less than that of the luminary; sometimes a ring appears as if made up of two lying side by side, and crossing each other in very acute angles at certain points of their course. As in the rainbow, the red border is most defined, the opposite being lost in a diffused light; and the sky just within these rings usually appears more dark than elsewhere. The third and largest ring, having a radius of about 90° , is usually white; but it is seldom or never complete, even in the visible portion of sky. The same obvious atmospheric conditions that show these more ordinary forms, may also give rise to a white circle having the breadth of the solar disk, through which it passes, and extending completely around the sky in a plane parallel with the horizon. A second white band of the same breadth may pass through the sun's disk in a vertical direction, while at the points in which this intersects the two ordinary rings above, tangent colored arcs may be seen curving away from the rings respectively, and tending to include the zenith.—*Parhelia and Paraselenæ.* A parheliion is an attendant image, more or less distinct, of the sun's disk, which may appear with any halo, at one, two, or more points near the sun; but which is more frequently formed in the course of the horizontal or vertical white bands, or in both, at or slightly without the intersection of these with the ordinary halos. Parhelia show the usual colors of halos, in the same order, but more brightly, and even when the latter are not perceptibly colored. They seldom appear at once at more than three or four of the intersections, and sometimes present a sort of tail in the direction opposite the luminary. Popularly, they are known as sun

dogs, or mock suns. The corresponding appearances about the moon are termed paraselenæ. The more complicated phenomenon, showing both the halos and mock luminaries, although somewhat rare, is still much varied in form. Among the earlier clearly recorded observations may be named an example of the solar observed by Scheiner at Rome in 1629, and of the lunar by Hevelius of Dantzic in 1660. Very brilliant halos were seen about the sun for several days in succession at Moscow in 1812, during its occupancy by the French; the most splendid instance on record occurred at Gotha, May 12, 1824.—In high northern latitudes, halos and parhelia are very frequent; Capt. Parry always saw the former about the time of full moon. But whether in higher or lower latitudes, they are only seen when there intervene between the luminary and the observer those highest thread-like forms of cloud, the cirrus or cirro-stratus. The cold prevailing in the elevated regions occupied by these clouds renders it quite certain that their particles must be in the frozen condition—a fine ice mist—such as we experience in the coldest days of winter, and which, driven against the face by a wind, actually prick the skin. These crystals incline chiefly to the form of hexagonal prisms; and to refraction and decomposition of light passing through certain angles of these, Mariotte was led to ascribe the production of halos. For any refracting angle of a prism there exists a minimum angle of deviation, dependent on the density and the angle. Now, the minimum deviation of a decomposed ray occurs when the angle of refraction is just half the refracting angle of the prism used. The refracting angle of the ice prisms being 60° , the angle of refraction giving the least deviation for the red ray from the original course of the light must be 30° ; and, the refractive index of ice being 1.31, the angle of incidence must be 41° . Then the deviation, being equal to twice this angle less the refracting angle, or $2 \times 41^{\circ} - 60^{\circ}$, is 22° , a result very closely agreeing with that of observation for the smallest and most common form of halo. To produce this ring, then, it is only necessary to imagine the minute prisms of ice floating or descending through the air in all positions, but, owing to the resistance presented by the air to the action of their weight, taking especially horizontal and vertical directions; then, near to the position giving a minimum deviation of the transmitted rays, a considerable turning of the crystal about its axis gives only an insignificant change in the direction of the emergent light; and hence, a far larger number of the crystals will transmit red rays deviating from their previous rectilinear course by exactly or nearly this angle of 22° than by any other. The rays from the sun or moon being in effect parallel, there should therefore be seen, at nearly this angle with the luminary, a dim circle, red and defined within, but beyond this having the colors overlapping one another, and indistinctly seen

or resulting in white. The halo of 90° or 92° may be accounted for by the refraction occurring through the angles of 90° at which the sides of the ice prisms meet their bases, the minimum deviation for red in this case being about 45°. The partial polarization of the light in a plane tangent to the ring shows it to be refracted light; that of the rainbow being polarized in a plane normal to the circle, and mainly due to reflection. Musschenbroek saw large colored halos about the moon, by looking through plates of ice formed on the panes of his window. The white horizontal and vertical bands can be explained by reflection from the vertical faces of crystals, descending in a calm air and in all possible azimuths. The parhelia may be considered as being the intensified effect at certain points of a greater condensation of the dispersed rays at the angles of minimum dispersion; so that they are to the halo what the halo itself is to the diffused light thrown on the surrounding cloud. The fact that they are usually a little without the rings has been supposed due to the greater obliquity of the crystals, at the points where they appear, to the plane of refraction. But while the explanation of these simpler parts is quite satisfactory, that of the more complicate and peculiar phenomena becomes extremely difficult; and we can only in a general way refer these to the variety of changes, including reflection and simple and double refraction, of which light is capable, and to the probable effects of extraordinary forms and combinations of the crystals. If the views taken of the phenomenon be correct, then, by consequence, halos prove what is the temperature of the highest cloud region, and the condition of cloud occupying it. Certain it is that they are closely connected with peculiar meteorological changes; and that, occurring in summer, they indicate rain, and it has been said wind, while in winter they precede snow, or it may be also frosts.

HALS, Francisus, a Dutch painter, born at Mechlin in 1584, died in Haarlem, Aug. 20, 1666. He was inferior as a portrait painter only to Vandyke. He passed his whole life in the Netherlands, chiefly at Delft or Haarlem. He left a great number of paintings, and is one of the best representatives of that school of the Netherlands which made no effort to idealize, but only sought accurate representation.

HALSTEAD, Murat, an American journalist, born at Ross, Butler co., Ohio, Sept. 2, 1829. Until the age of 19 he passed the summers in working on his father's farm and the winters at school. He completed his education at Farmer's college, near Cincinnati, in 1851. At 18 years of age he became a contributor to newspapers, and before leaving college had acquired facility as a writer of fiction and light miscellanies. Abandoning his intention of studying law, he established himself in 1851 in Cincinnati, and started a Sunday newspaper, of which only two numbers were published. After finding employment on the "Enquirer,"

the "Columbian and Great West," and other papers, he became in March, 1852, city editor of the "Cincinnati Commercial," and a few months later was appointed its news editor. In May, 1854, he acquired a small pecuniary interest in the "Commercial," and upon the death of the principal owner in 1866 the control of the paper passed into his hands. During the 12 years preceding this event its good will alone had increased more than fourfold in value, and it had become through Mr. Halstead's efforts one of the most influential papers of the west. It is independent in politics.

HALTON, a county of Ontario, Canada, bordering S. E. on Lake Ontario, near its W. extremity; area, 372 sq. m.; pop. in 1871, 22,606, of whom 8,074 were of Irish, 6,993 of English, and 5,108 of Scotch origin or descent. It is traversed by the Grand Trunk and Great Western railways. Capital, Milton.

HALYBURTON, Thomas, a Scottish theologian, born at Dupplin, Dec. 25, 1674, died in St. Andrews, Sept. 23, 1712. He studied at St. Andrews, was for a time domestic chaplain in the family of a nobleman, became minister of the parish of Ceres in 1700, and in 1711 was appointed professor of divinity at St. Andrews. His principal works are: "Inquiry into the Principles of Modern Deists," "The Great Concern of Salvation," "Natural Religion Insufficient," "Essay on the Nature of Faith," and "Inquiry on Justification." These have been frequently republished (latest ed., London, 1835). His "Memoirs of his Life," with an introductory essay by the Rev. Dr. Young (Glasgow, 1824), has been reprinted in America.

HALYS, the ancient name of the Kizil Irnak (red river), the largest river of Asia Minor. It rises in the mountains which in antiquity formed the boundary between Armenia Minor and Pontus; pursues mostly a S. W. course, receiving many tributaries on its way, as far as the vicinity of Kaisariyeh (the ancient Cæsarea Mazaca); then turns N. W., and gradually N. E., and discharges itself by several mouths into the Euxine between Sinope and Samsun (Amisus). It has a circuit of about 600 m. Its ancient importance appears from the fact that Asia was often divided into *Asia cis Halyn* and *Asia trans Halyn*. It once separated the great Lydian empire from the Medo-Persian, and near its banks was fought the first battle between Cræsus and Cyrus.

HAM, a town of France, in the department of Somme, 67 m. N. E. of Paris; pop. about 2,400. Its old castle, strengthened by modern works, has become a fortress of some importance, and has long been used as a state prison, for which it is well adapted. The central round tower or donjon is 100 ft. high and 100 ft. wide, and the walls are of masonry 36 ft. thick. It was built in 1470 by the count de St. Pol, who was afterward beheaded by Louis XI. Among the numerous eminent persons imprisoned in the castle of Ham have been Joan of Arc, who was kept there a few days before

being surrendered to the English, Mirabeau, the ministers of Charles X., Louis Napoleon (1840-'46), Cavaignac, Lamoricière, Changar-

lived there in the first half of the 11th century; another edifice is believed by the inhabitants to contain the tombs of Esther and

Mordecai. There are also a synagogue and an Armenian church. The town is mostly decayed and unattractive; the tomb of Avicenna, however, draws numerous pilgrims. It has a hot mineral spring, some manufactures in silk fabrics and carpets, and a large trade with Bagdad and other cities of Persia. Hamadan was conquered by the Arabs shortly after the death of Mohammed, was destroyed and rebuilt, and was taken by the Seljuks, and by the Mongols of Genghis Khan and Tamerlane.

HAMAH, or **Hamath** (Heb., fortress or citadel), a city of northern Syria, situated

nier, and others. It was surrendered to the Germans, Nov. 21, 1870.

HAM, one of the sons of Noah, supposed to have been the youngest. The name signifies in Hebrew "hot" or "burnt," and is regarded as indicative of the regions allotted to his descendants, who, according to Gen. x., occupied the southern parts of the ancient world. The foundation of the empires of Assyria and Egypt is attributed to them, as well as that of Sidon and other Phœnician states. Egypt, in particular, is designated in poetical passages of the Scriptures as the "land of Ham," which answers to the Coptic name of that country, *Kemî* or *Khamî*, the *Xyula* of Plutarch, and the *Chmè* of the Rosetta inscription, according to Champollion. The Canaanites formed a branch of the Biblical Hamitic race.

HAMADAN, a town of Persia, in the province of Irak Ajemi, at the foot of Mt. Elwend, 175 m. W. S. W. of Teheran, on the site, it is generally supposed, of ancient Ecbatana, but according to Rawlinson of one of two Median cities of that name; pop. about 40,000. It occupies a large surface on sloping ground, and has numerous gardens, bazaars, baths, caravansaries, and mosques. Near one of the last is an edifice which contains the tomb of Avicenna, the celebrated Arabian physician, who

on both sides of the Asy or Orontes, 30 m. N. of Homs; pop. about 40,000, of whom about 10,000 are Greeks or fellahs belonging to the Greek church, about 300 Jacobites, and the remainder Moslems, the Jews having entirely disappeared. The Christian quarter in the S. W. part of the city is described by Burton as filthy and miserable. Four bridges span the river, and several huge wheels turned by the current raise the water to the level of the houses and fields. Each aqueduct and wheel is the property of a limited company. There are 24 minarets. An interesting part of modern Hamah is the castle mound, which, like that of Homs,



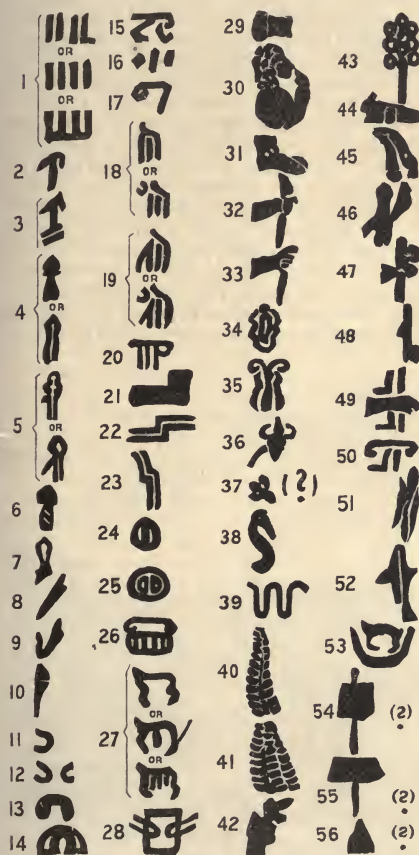
Fortress of Ham.



Hamah.

was probably the site of an ancient temple.—It appears from Scripture that Hamath was the capital of a kingdom at the period of the exo-

dus. Its king Toi yielded allegiance to David. Hamath was called great by Amos, and was ranked by the Assyrians among their most important conquests. According to Genesis, it was originally inhabited by the Canaanites, and it is frequently mentioned as the northern border of the promised land. Under the name Epiphania it became famous in the days of the Seleucidæ, and it is said that Seleucus Nicator kept there his stud of 500 elephants and 30,000 brood mares. Under the Moslem rule it



Characters of the Hamath Inscriptions.

produced the celebrated scholar Abulfeda, prince of Hamah. The town has recently attracted considerable attention from the number of stones bearing inscriptions which have been found there. Burckhardt noticed these stones in 1812, but they remained in obscurity till 1870, when J. A. Johnson, consul general for the United States at Beyrout, and the Rev. S. Jessup of the Syrian mission, rediscovered them while looking through the bazaar of the old town. Copies and impressions of the inscriptions were carried to England by Burton

and Tyrwhitt-Drake, and to the United States by Lieut. Steever and Prof. Paine. Copies of them have been published by the English exploration fund, by the anthropological society of Great Britain and Ireland, and by the Palestine exploration society of New York. Those issued by the last named in September, 1873, are absolute facsimiles prepared by W. H. Ward after the impressions of Steever and Paine. The inscriptions have been discussed by many eminent scholars, and notices of them have been published by Burton, Eisenlohr, Petermann, Hyde Clark, E. Thomas, Carter Blake, Staniland Wake, the Rev. Dunbar J. Heath, and others. The stones are of black basalt, and the inscriptions are in relief. The writing is of an unknown character. Some of the signs resemble the Cypriote and others the Himyaritic. Mr. E. Thomas has discovered that some small clay impressions of seals in the British museum are in the Hamath character; they had been attached to documents in the palace of Sennacherib at Nineveh, and date from about 700 B. C. In the Assyrian inscriptions appear a few notices of Hamath, which tend to show that the inhabitants were Semites, and that their neighbors to the north were a powerful tribe, called the Patina, who spoke a non-Semitic language. As the stones may have been removed from their original site to be used for building purposes in Hamath, it is possible that the inscriptions belong to the Patina. The various characters found in the Hamath inscriptions are shown in the preceding column.

HAMAN, a minister of the Persian king Ahasuerus, of the race of Agag, who, because Mordecai the Jew refused to pay him homage, resolved on the destruction of all the Jews in the Persian monarchy. He contrived to obtain a decree for this purpose; but Esther, the Jewish wife of Ahasuerus, interposed for their deliverance, and Haman was hanged on the gibbet he had prepared for Mordecai. His history is contained in the book of Esther.

HAMANN, Johann Georg, a German author, born in Königsberg, Aug. 27, 1730, died in Münster, June 21, 1788. He was destined for the pulpit, but became a clerk in a mercantile house, and afterward held many small public offices, devoting his leisure to study. He wrote under the *nom de plume* of "the Magus of the North." His works consist of small essays, and although his style was diffuse and obscure, their merits were recognized by Lessing, Mendelssohn, Herder, and Goethe. Fragments of his writings were published by Cramer, under the title of *Sibyllinische Blätter des Magus aus Norden* (1819), and a complete edition by Roth (7 vols., 1821-'5, with a volume of additions and explanations by Wiener, 1843). *Hamann's des Magus in Norden Leben und Schriften*, edited by Gildemeister, was published in 5 vols., 1857-'68, and a new edition of his *Schriften und Briefen*, edited by Petri, in 4 vols., 1872-'4.

HAMBACH, a village of Rhenish Bavaria, near Neustadt, 15 m. W. of Spire; pop. about 2,200.

It contains a castle of the middle ages called Kastanienburg. A celebrated political gathering, known as the *Hambacher Fest*, was held here, May 27, 1832, by 30,000 persons, for the purpose of agitating and preparing "the regeneration of Germany as a free country." Siebenpfeiffer, Wirth, and other leaders were indicted on June 28; and a sanguinary conflict took place on the first anniversary of the gathering between the soldiery and the citizens, the Bavarian government having prohibited its celebration. The castle was presented in 1842 to the crown prince, the late king of Bavaria, and called after him Maxburg. It was greatly damaged during the revolution of 1849.

HAMBLEN, an E. county of Tennessee, formed since the census of 1870, bounded N. W. by Holston river and S. E. by the French Broad; area, about 150 sq. m. It is traversed by high ridges and fertile valleys, belonging to the Alleghany range. Iron ore is found. The East Tennessee, Virginia, and Georgia, and the Cincinnati, Cumberland Gap, and Charleston railroads cross it. The assessed value of property in 1871 was \$1,451,819. Capital, Morristown.

HAMBURG. I. A free state of the German empire, comprising the city of Hamburg with its suburbs, the district of Geest, and the baili-

wicks of Bergedorf and Ritzbüttel; area, 158 sq. m.; pop. in 1871, 338,974, of whom the greater part are Lutherans, with 7,748 Roman Catholics and 13,796 Jews. The principal towns belonging to the territory of Hamburg are Barmbeck, Bergedorf, Borgfelde, Cuxhaven, Eilbeck, Eimsbüttel, Hamm, Hohenfelde, Ritzbüttel, and Uhlenhorst. The state has one vote in the federal council, and sends three deputies to the German Reichstag. Its army is incorporated with the Prussian army, and its burgher guard no longer exists, having been disbanded in 1868. By the constitution which went into force Jan. 1, 1861, the government consists of a senate of 18 members and a house of burgesses of 192 members. The members of the senate are elected for life, though a senator may retire after ten years. The senators elect from among themselves a first and a second burgomaster, who hold their office for one year. Nine senators must have studied law, and the other nine are usually merchants. Of the burgesses, 84 are chosen by general election, 48 are owners of real estate elected by the property holders, and 60 are representatives of the courts and the administration; their term is six years, and half the number are elected every three years. The revenue is



Hamburg.

derived mainly from direct taxes, principally the income tax, and the disbursements include the maintenance of unobstructed navigation of the Elbe, over which from the port to the mouth Hamburg has entire jurisdiction. The budget for 1873 estimated the revenue at \$4,716,000, the expenditure at \$4,924,000, and the public debt at \$9,051,000. II. One of the three free cities of Germany, on the N. bank of the Elbe, at the mouth of the Alster, 60 m. N. E.

of Bremen, and 33 m. S. W. of Lübeck; lat. 53° 32' 51" N., lon. 9° 58' 33" E.; pop. in 1871, 240,251. The Alster, a tributary of the Elbe, flows through the city and forms two basins, the outer and the inner Alster, and numerous canals intersect the city and communicate with both rivers. A magnificent bridge, begun in 1868 and finished in 1872, crosses the Elbe, and 60 other bridges span the rivers and canals. The old and new Jungfernstieg around

the inner Alster, the Alsterdamm, and the Wall are the fashionable promenades, and the environs are places of resort. One of the finest buildings is the exchange, which contains a mercantile library of 40,000 volumes. Other important edifices are the government house, with its great hall for civic feasts; the new museum, with a collection of modern pictures; the Johanneum college, containing the city library of 200,000 volumes and 5,000 manuscripts; the great hospital in the suburb of St. Georg, with accommodations for more than 4,000 patients; the orphan asylum, educating and providing for 600 pupils; the Jewish hospital, endowed by Salomon Heine in 1840, and now open to all denominations; and the *Rauhes Haus*, at Horn, near the city, founded in 1833 by Johann Heinrich Wichern, for the care and training of depraved and abandoned children. There are numerous other charitable and educational institutions, and the botanic and zoological gardens are among the most extensive in Germany. The church of St. Catharine dates from the 14th century; St. Nicholas and St. Peter are both modern Gothic edifices; St. James has a tower 343 ft. high; St. Michael is surmounted by a steeple 428 ft. high, one of the loftiest in Europe; the new synagogue for the orthodox Jews was opened in 1859.—Hamburg communicates by railway with the leading German cities, and by steamship with the principal ports of Europe, and with New York, New Orleans, Havana, and Brazil. The port is extensive; vessels drawing 14 ft. come up to the city, and their cargoes, discharged into barges, are distributed by the canals to the warehouses; larger ships discharge at Cuxhaven. The emigration, mostly to the United States, amounted in 1870 to 32,556, in 1871 to 42,224, in 1872 to 74,406; and from 1846 to 1872 the total was 740,874. At the end of 1872 the merchant marine comprised 402 vessels, including 62 steamers, of an aggregate of upward of 200,000 tons; the entrances of sea-going vessels were 5,913, of which 728 were in ballast; the clearances were 5,872, of which 2,163 were in ballast; the number of steamers was 2,749. The imports in 1871 amounted to \$442,000,000, and the maritime exports in 1872 (the official reports giving weights only) amounted to 13,448,000 cwt. The principal articles of import are cotton, wool, woollen and worsted stuffs, yarn, silk, hides, hardware, iron, coffee, sugar, wine, brandy, rum, tobacco, indigo, dye woods, tea, pepper, and coal. The exports consist of the same articles, except coal, Hamburg being mainly a centre of distribution. The manufacturing industry is important, and comprises ship building, sugar refining, distilling, calico printing, dyeing, the preserving of provisions, and the manufacture of sail cloth, ropes, leather, woollen goods, cigars, cutlery, musical instruments, carriages, furniture, hats, soap, glue, &c.; and the banking, insurance, and publishing interests are enormous.—Hamburg

is a very ancient city. Charlemagne built a castle here about 809. During its growth from a village into a town it was several times destroyed. The emperor Otho IV. (1215) made it an imperial city, and in 1241 a commercial treaty with Lübeck laid the foundation of the Hanseatic league. The reformation was formally introduced about 1529. During the early part of the 16th century, although recognized as a state of the empire, it was without a seat or vote in the diet, and was troubled by the kings of Denmark, who claimed sovereignty over it as counts of Holstein. By convention with Denmark in 1768 its rights were conceded, and in 1770 it was confirmed as a free city of the Germanic empire. In 1803 it fell under the power of the French, who after repeated exactions annexed it to the French empire as the capital of the department of Bouches d'Elbe. In 1813-'14 the French, under Marshal Davoust, sustained in it that terrible siege in which upward of 30,000 citizens were driven out in midwinter, and 1,100, whose monument is to be seen near Altona, perished of hunger. On June 8, 1815, it joined the Germanic confederation as a free Hanse town. On May 5, 1842, a conflagration broke out, and continued four days, destroying one third of the city; the rebuilding of the burnt district after a general plan has added greatly to the beauty of many of its streets and public buildings. The city hall, which escaped from that casualty, was destroyed by fire in 1859, but has since been rebuilt. The constitution of the North German confederation, and likewise that of the German empire, left Hamburg at liberty to remain outside of the Zollverein as long as it wished. When Schleswig-Holstein and Mecklenburg had joined that league, Hamburg was on all sides surrounded by the territory of the Zollverein, and therefore found it to its advantage to join it for one portion of its rural districts, embracing 124 sq. m. and 32,792 inhabitants. The remainder, in union with the neighboring Prussian city Altona, continues a free port territory.

HAMELN, a town of Prussia, in the province and 24 m. S. W. of the city of Hanover, on the Hamel and the Weser; pop. in 1871, 8,530. Over the Weser, which here forms an island, is a suspension bridge more than 800 ft. long. The town has a gymnasium, some manufactures of woollens and cottons, distilleries, and breweries. It was formerly fortified, and near it, in 1633, the Swedes obtained a victory over the imperial troops. It is famous as the scene of the legend of the piper of Hameln, who offered to clear the town of rats for a certain sum of money, which the authorities agreed to pay. The vermin followed him as he played on his pipe, and were all drowned in the Weser. The people, released from their torment, refused to pay the stipulated sum, and the piper vowed vengeance. On June 26, 1284, the feast of Saints John and Paul, he reappeared in the streets playing his pipe, and all the children,

charmed by his music, followed him into a cavern of the mountain, where they disappeared and were never afterward heard from. For a long time the town dated its public documents from this calamity. The legend is the subject of a poem by Robert Browning.

HAMERLING, Robert, a German poet, born at Kirchberg, Lower Austria, March 24, 1832. After having been a chorister, he studied medicine, philosophy, and philology. From 1855 till about 1866 he was professor at the gymnasium of Trieste, and has since resided near Gratz in the enjoyment of a pension from the government. His fame rests chiefly on his epic poems *Ahasverus in Rom* (Hamburg, 1866; 7th ed., 1871), *Sinnen und Minnen* (3d ed., 1870), and *Der König von Sion* (1868; 5th ed., 1872). A collection of his smaller poems appeared in Hamburg in 1871, and in the same year he published a drama, *Danton und Robespierre*.

HAMERTON, Philip Gilbert, an English author, born in Manchester, Sept. 10, 1834. His mother died when he was a fortnight old, and his father when he was ten years old, leaving his early education to be superintended by a paternal aunt, who put him in school at Doncaster. He went afterward to Barnley school, where, principally as a private pupil, he was fitted for Oxford. Becoming interested in landscape painting, he studied that art in the studio of Mr. Pettill in London, and then went back to Lancashire, where he passed several years, devoting himself to art and literature. He published anonymously many articles in periodicals, besides "Observations on Heraldry" (London, 1851), and "Isles of Loch Awe, and other Poems" (12mo, 1855). In 1855 he became a student of William Wyld in Paris, remaining two or three years, when he returned home and entered upon a mode of life in Scotland described in his "Painter's Camp in the Highlands, and Thoughts about Art" (2 vols. 8vo, 1862), since published as two separate works. For three years he was the art critic of the "Saturday Review," and his contributions were sought by other publications. In 1859 he married a daughter of M. Frédéric Gindriez, and after living for a while in Sens, where he painted some of his best pictures, he took up his residence in Autun, where he now lives (1874). He has invented a new method of etching, which he calls the positive process. (See ENGRAVING.) His later works, several of which have been republished in the United States, comprise "Etching and Etchers" (1866); "Contemporary French Painters" (1867); "The Etcher's Handbook" (1868); "Painting in France after the Decline of Classicism" (1868); "Wenderholme, a Story of Lancaster and York" (3 vols. 8vo, 1869); "The Unknown River" (1870); "Chapters on Animals" (1873); and "The Intellectual Life" (1873). Hamerton's paintings have been praised by some critics, but they are not popular. Among the best of his efforts are "Kilchurn Castle," "Sens from the Vineyards," and "The River Yonne."

Mr. Hamerton's wife has published "Jeanne Laraguay," a novel (London, 1864).

HAMILCAR BARCA, or *Bareas*, a Carthaginian general, born shortly before the beginning of the first Punic war, fell in a battle in Spain, 229 B. C. The name Barca, which he had in common with many distinguished Carthaginians, is supposed to signify lightning. He first appears in history as commander of a Carthaginian army in the 18th year of the first Punic war, 247 B. C. The Romans then had the advantage. Sicily, the main scene of the war, was in their hands, with the exception of Drepanum and Lilybæum, on the W. coast, which they were blockading from the land side. Hamilcar seized the commanding position of Mount Ercte (now Monte Pellegrino), near Panormus (Palermo), where he encamped, while the bay sheltered the Carthaginian fleet. From this stronghold he made successful incursions into the interior of the island as far as the E. coast, and upon the S. coast of Italy, vanquished several Roman detachments, and took Eryx near the N. W. angle of Sicily (244). Holding this still more favorable position, he continued his incursions over the island and the peninsula. It was only the great defeat of the Carthaginian fleet under Hanno by the newly formed Roman squadron under Lutatius Catulus, near the Ægates isles (241), which compelled him to give up the struggle. He was then commissioned to conclude a peace, and with his army embarked at Lilybæum and returned to Carthage. The scene of war was then transferred to Spain, whither Hamilcar was eager to proceed; but he was delayed by a mutiny of some mercenary troops, which soon threatened the existence of the state. After the defeat of Hanno by the mercenaries, Hamilcar took the field against them, and finally succeeded in crushing the rebellion, which had raged for more than three years. He now entered upon his Spanish campaign, taking with him his young son Hannibal, whom before starting (238) he made to swear eternal enmity to Rome. The details of this new campaign are little known, but it is certain that he had conquered a part of Spain when he was overtaken by death. His conquests were continued by his son-in-law Hasdrubal, and afterward by Hannibal. He left two other sons, Hasdrubal and Mago, who both partook in the wars of their brother.

HAMILTON, the name of nine counties in the United States. **1.** A N. E. county of New York, drained by the head waters of Black, Hudson, Raquette, and Sacondaga rivers; area, 1,711 sq. m.; pop. in 1870, 2,960. The surface is high, hilly, and diversified with lakes; the soil is poor, and a large portion of the county, traversed by the Adirondack mountains, is still a wilderness. Timber and iron are abundant. The chief productions in 1870 were 5,781 bushels of Indian corn, 21,980 of oats, 6,392 of buckwheat, 46,317 of potatoes, 78,312 lbs. of butter, and 7,358 tons of hay. There were

606 horses, 1,063 milch cows, 1,879 other cattle, 3,748 sheep, and 519 swine. Capital, Sagville. **II.** A N. county of Florida, bordering on Georgia, bounded E. and S. by the Little Suwanee and W. by the Withlacoochee river, and intersected by the Allapaha; area, 400 sq. m.; pop. in 1870, 5,749, of whom 2,363 were colored. The surface is even, and the soil fertile. The Atlantic and Gulf railroad traverses it. The chief productions in 1870 were 83,930 bushels of Indian corn, 6,185 of oats, 7,395 of peas and beans, 2,235 of sweet potatoes, and 1,592 bales of cotton. There were 290 horses, 333 mules and asses, 800 milch cows, 2,351 other cattle, and 3,167 swine. Capital, Jasper. **III.** A N. central county of Texas, intersected by Leon river; area, 825 sq. m.; pop. in 1870, 723, of whom 17 were colored. The surface consists mostly of rolling prairies, dotted with groves of timber. There are numerous streams, the banks of which are fringed with trees. The soil is fertile. The chief productions in 1870 were 3,330 bushels of wheat, 27,175 of Indian corn, 18 bales of cotton, and 19,775 lbs. of butter. There were 991 horses, 1,653 milch cows, 9,703 other cattle, 710 sheep, and 2,216 swine. Capital, Hamilton. **IV.** A S. E. county of Tennessee, bordering on Georgia, and touching Alabama on the S. W., intersected by the Tennessee river, which is here navigable by steamboats; area, 380 sq. m.; pop. in 1870, 17,241, of whom 4,188 were colored. It abounds in coal and iron. The surface is broken by high ridges connected with the Cumberland mountains, and the soil is fertile. The Nashville and Chattanooga, the Alabama and Chattanooga, and the East Tennessee, Virginia, and Georgia railroads traverse it. The chief productions in 1870 were 103,716 bushels of wheat, 353,700 of Indian corn, 44,963 of oats, 12,912 lbs. of wool, 79,214 of butter, and 1,033 tons of hay. There were 1,875 horses, 2,393 milch cows, 5,040 other cattle, 6,741 sheep, and 15,359 swine; 1 manufactory of cars, 3 of furniture, 2 of iron, 2 of machinery, 2 flour mills, 1 tannery, 1 currying establishment, 1 planing mill, and 2 saw mills. Capital, Chattanooga. **V.** A S. W. county of Ohio, bordering on Indiana, separated from Kentucky by the Ohio river, and drained by Great and Little Miami and Whitewater rivers; area, 390 sq. m.; pop. in 1870, 260,370. It has an undulating surface and a rich soil. The grape is extensively cultivated near the Ohio river. It is crossed by the Miami and White-water canals, and by several railroads centering in Cincinnati. The chief productions in 1870 were 162,607 bushels of wheat, 1,226,726 of Indian corn, 268,089 of oats, 96,979 of barley, 562,537 of potatoes, 773,387 lbs. of butter, 126,400 of cheese, and 25,304 tons of hay. There were 8,531 horses, 12,413 milch cows, 3,254 other cattle, 3,647 sheep, and 21,165 swine. There were 2,469 manufacturing establishments, chiefly in Cincinnati, the county seat, with an aggregate capital of \$42,646,152,

and an annual product of \$78,905,980. **VI.** A central county of Indiana, drained by White river and several smaller streams; area, 400 sq. m.; pop. in 1870, 20,882. The surface is slightly diversified and the soil extremely rich. It is traversed by the Indianapolis, Peru, and Chicago railroad. The chief productions in 1870 were 548,039 bushels of wheat, 972,660 of Indian corn, 74,164 of oats, 65,094 of potatoes, 62,206 lbs. of wool, 336,215 of butter, and 9,791 tons of hay. There were 7,647 horses, 5,630 milch cows, 9,661 other cattle, 21,796 sheep, and 33,555 swine; 13 manufactories of carriages, 2 of barrels and casks, 10 of bricks, 8 of saddlery and harness, 6 of tin, copper, and sheet-iron ware, 2 of woollen goods, 11 flour mills, and 32 saw mills. Capital, Noblesville. **VII.** A S. county of Illinois, drained by branches of Little Wabash river and Saline creek; area, 395 sq. m.; pop. in 1870, 12,993. It has a well wooded surface, diversified with prairies of moderate fertility, and a great deal of swamp land in the north part. The St. Louis and Southeastern railroad and branch to Shawneetown traverse it. The chief productions in 1870 were 92,476 bushels of wheat, 735,252 of Indian corn, 203,464 of oats, 28,402 of potatoes, 34,074 gallons of sorghum molasses, 471,860 lbs. of tobacco, 42,776 of wool, 195,246 of butter, and 6,397 tons of hay. There were 4,603 horses, 3,349 milch cows, 4,974 other cattle, 20,117 sheep, and 24,842 swine; 15 carriage factories, 2 woollen factories, 9 flour mills, and 9 saw mills. Capital, McLeansborough. **VIII.** A central county of Iowa, intersected by the Boone, and containing the head waters of Skunk river; area, 576 sq. m.; pop. in 1870, 6,055. The surface is undulating and the soil good. Bituminous coal is abundant. The Dubuque and Sioux City railroad intersects the N. part. The chief productions in 1870 were 126,978 bushels of wheat, 214,818 of Indian corn, 80,206 of oats, 26,323 of potatoes, 153,755 lbs. of butter, and 14,715 tons of hay. There were 1,968 horses, 1,990 milch cows, 3,015 other cattle, and 2,920 swine; 1 manufactory of agricultural implements, and 3 saw mills. Capital, Webster City. **IX.** A S. E. county of Nebraska, bounded N. W. by the Platte river, and watered by branches of the Big Blue; area, about 530 sq. m.; pop. in 1870, 130. The value of farms was \$43,400; of farm products, \$14,645; of live stock, \$12,111. Capital, Farmer's Valley.

HAMILTON, a town and village of Madison co., New York, on the Chenango river, 90 m. W. of Albany and 30 m. S. W. of Utica; pop. of the town in 1870, 3,687; of the village, 1,529. The village is on the Utica branch of the New York and Oswego Midland railroad, and contains a carriage factory, a tannery, a cigar manufactory, a furnace, a cheese factory, a national bank, a hotel, a female seminary, a union school, two weekly newspapers, a bi-weekly (published by the college students), and five churches. Here are situated, under

the control of a common board of trustees, Hamilton theological seminary (Baptist), Madison university, and Colgate academy. These schools were developed out of the "Hamilton Literary and Theological Institution," founded in 1820. Madison university was chartered in 1846. Its faculty in 1873-'4 consisted of 10 professors. A scientific as well as a classical course may be pursued. The number of volumes in the libraries was 10,860. The faculty of the theological seminary consisted of four professors, who were also members of the university faculty; and Colgate academy has a principal, with three other instructors. The theological seminary had 43 students, the university 106, and the academy 60. The academy has a commodious edifice. The university buildings are Alumni hall, East college, and West college; besides which the grounds contain a president's house, a gymnasium, a boarding hall, and professors' houses. The town also contains the villages of East Hamilton, Hubbardsville, Poolville, and part of Earlville, through which the main line of the New York and Oswego Midland railroad passes.

HAMILTON, a city and the capital of Butler co., Ohio, on both sides of the Miami river and on the Miami canal, at the intersection of the Cincinnati, Hamilton, and Dayton, the Cincinnati, Richmond, and Chicago, and the Cincinnati, Hamilton, and Indianapolis railroads, 20 m. N. of Cincinnati, and 90 m. W. S. W. of Columbus; pop. in 1850, 3,210; in 1860, 7,223; in 1870, 11,081, of whom 3,062 were foreigners. It is surrounded by a rich and populous district, and is extensively engaged in manufacturing. The principal establishments are machine shops, iron foundries, paper mills, woollen mills, flour mills, distilleries, breweries, manufactories of carriages and wagons, boots and shoes, railroad supplies, ploughs, saws, rope, pumps, brooms, candles, boilers, &c. Abundant water power is supplied by a hydraulic canal, which gives a fall of 28 feet. There are eight hotels, and two national banks with \$200,000 capital; valuation of property in 1873, \$5,836,065. The city is divided into four wards, and is governed by a mayor and council. It has five public schools, including a high school, having in 1872 28 teachers and 1,200 pupils; a free library of 2,000 volumes, four weekly newspapers (one German), and 12 churches. The quarter on the W. bank of the river, formerly the village of Rossville, was incorporated with Hamilton when the municipal charter was granted in 1853.

HAMILTON, a city and the county seat of White Pine co., Nevada, situated in the S. W. part of the county, 230 m. E. of Carson City and 215 m. S. W. of Salt Lake City; lat. 39° 15' N., lon. 115° 27' W.; pop. in 1870, 3,913, of whom 160 were Chinese. It is built at the N. base of Treasure hill, 8,000 ft. above the level of the sea, and 120 m. S. of the Central Pacific railroad, in the midst of the White Pine mining district, which comprises three parallel

mountains, viz.: White Pine, 11,000 ft. high, and Babylon and Treasure hills, each 9,000 ft. high. Treasure hill contains rich chloride silver ores, while the other two yield complex ores, embracing carbonates, oxides, and sulphites. All the valuable minerals abound here except tin and platinum, and the ores assay as high as \$1,500 a ton in silver. The climate of Hamilton is rigorous, but very healthful. Insects and reptiles are unknown. Stages run daily to Palisade on the railroad and to the mining districts S. of the city, and there is a tri-weekly line to the east. It contains a court house, an Episcopal and a Roman Catholic church, a public school with two departments, a weekly newspaper, a bank, two hotels, and a brewery. In the neighborhood are nine quartz mills with 155 stamps, extensive smelting works, and an incomplete refinery. The streets are graded, and water is supplied by works erected at a cost of \$300,000.—Hamilton owes its origin to the discovery of silver in Treasure hill in 1868, followed by a great influx of population and extensive operations. But business was soon paralyzed by litigation concerning titles, coupled with the refusal of speculators to work their claims, and by the failure of the smelting works through ignorance of the proper treatment. The city consequently dwindled, until, after being nearly destroyed by fire in June, 1873, it contained only 600 inhabitants; but it is now (1874) recovering.

HAMILTON, a city, port of entry, and the capital of Wentworth co., Ontario, Canada, situated at the S. W. extremity of Burlington bay, at the W. end of Lake Ontario, 36 m. S. S. W. of Toronto, and 42 m. W. by N. of Niagara Falls; pop. in 1836, 2,846; in 1846, 6,822; in 1851, 10,248; in 1861, 19,096; in 1871, 26,716. The city is built on sloping ground, extending from the foot of a hill about 1½ m. to the shore of the bay, and is laid out with considerable regularity. The principal thoroughfare, King street, runs E. and W. The commercial quarter is about a mile back from the bay. There are several public squares, on which the government buildings generally front, Court House square and Market square being among the finest. The city is lighted with gas, intersected by a system of sewers, and supplied with water from Lake Ontario (6 m. distant), by means of a magnificent system of works, which cost about \$800,000. The public and private buildings are mostly either of brick or of freestone or limestone, brought from quarries in the neighborhood. The most elevated sites are occupied by residences and gardens. The banks, public offices, churches, hotels, and some of the stores, are good specimens of architecture. The Great Western and Hamilton and Lake Erie railways furnish communication with the principal points of Canada and the United States. Its situation at the head of navigation on the lake, and in a rich and populous

district, affords excellent commercial advantages. The Desjardins canal, 4 m. in length, connects it with Dundas; and the Burlington Bay canal, which cuts through the beach dividing the bay from the lake, shortens its communication with Lake Ontario. The imports for the year ending June 30, 1872, amounted to \$5,665,259; exports, \$805,526, of which \$597,820 was the value of agricultural products. The number of entrances from the United States was 207, with an aggregate tonnage of 33,584; clearances for American ports, 240, of 39,621 tons. Hamilton is the second city of Ontario in population, and the first in manufacturing industry. The manufactures embrace iron castings, machinery, agricultural implements, sewing machines, musical instruments, glassware, wooden ware, cotton and woollen goods, soap and candles, boots and shoes, leather, brooms, brushes, &c. There are also several saw and grist mills, a bank, and five branch banks. The city is divided into five wards, and is governed by a mayor and a board of 15 aldermen. It contains a deaf and dumb institution, two orphan asylums, a house of refuge, a city hospital, a convent, a boys' home, home for the friendless, and an industrial school. There are a female college, a business college, a grammar school, several primary schools, a mechanics' institute, a reading room, three daily and six weekly newspapers, and two monthly periodicals. The Great Western railway company has a library of 2,000 volumes. Hamilton is the seat of an Episcopal and a Roman Catholic bishop, and contains 23 churches. The city was laid out in 1813.

HAMILTON, a municipal and parliamentary borough of Lanarkshire, Scotland, near the junction of the Avon with the Clyde, 10 m. S. E. of Glasgow, with which it is connected by railway; pop. in 1871, 11,299. The most important public buildings are two fine parish churches. Manufactories of lace and muslins give employment to several thousand hands. Separated from the town by a wall and park is Hamilton palace, the seat of the duke of Hamilton. The surrounding grounds between the town and the Clyde comprise 1,460 acres, and are accessible to the public. A portion of the palace was built in 1591; but the greater part is comparatively modern. The interior decorations are magnificent, and the picture gallery is unsurpassed in Scotland. In the vicinity, on a rock 200 ft. above the Avon, are the ruins of Cadzow castle, the original seat of the Hamiltons; and near by are the remains of Cadzow forest, in which a herd of the original breed of wild cattle of Britain is still kept.

HAMILTON, Alexander, an American statesman, born in the island of Nevis, West Indies, Jan. 11, 1757, died in New York, July 12, 1804. His father had emigrated from Scotland and established himself in mercantile business in St. Christopher's. His mother was of French Huguenot descent; she had first been married

to a Dane named Levine, from whom she obtained a divorce. Hamilton's father failed in business, and passed the remainder of his life in poverty. His mother died in his childhood, but relatives of hers who resided at Santa Cruz took charge of the orphan, her only surviving child. There were no great advantages of education at Santa Cruz; but, possessing the French as well as the English tongue, young Hamilton eagerly read such books in both languages as fell in his way. At 12 years of age he was placed in the counting house of a merchant of Santa Cruz; but this occupation was not to his taste, and in his earliest extant letter, written to a schoolfellow, he speaks with disgust of the "grovelling condition of a clerk," and wishes for a war. But though he did not like his employment, he applied himself to it with characteristic assiduity; and the practical knowledge thus acquired was doubtless a stepping stone to his subsequent reputation as a financier. He began to use his pen early, and among other things he wrote a description of a hurricane by which St. Christopher's was visited in August, 1772. This description, published in a newspaper of that island, attracted so much attention as to induce his friends to comply with his wish for a better education than could be had at home, and to send him to New York for that purpose. He was first placed in a grammar school at Elizabethtown, N. J., where he enjoyed the acquaintance of the families of William Livingston and Elias Boudinot. After a few months he entered King's (now Columbia) college. Besides the regular studies of an undergraduate, he attended lectures on anatomy with the idea of becoming a physician. While he was thus engaged the quarrel with the mother country came to a crisis. Some differences in the city of New York as to the selection of delegates to the proposed continental congress led to a public meeting, July 6, 1774. Hamilton attended, and made a speech which first drew attention to him. Not long after he became a correspondent of "Holt's Journal," the organ of the New York patriots. A pamphlet having appeared attacking the proceedings of the continental congress, written by Samuel Seabury, afterward the first bishop of the American branch of the church of England, Hamilton replied to it in another pamphlet, written with so much ability that it was ascribed to Jay. This reply drew out an answer, to which Hamilton rejoined in a second pamphlet. These pamphlets, and another which he published in June, 1775, on the "Quebec Bill," gave him standing and consideration among the popular leaders. Meanwhile he had joined a volunteer corps, and applied himself to obtain information and instruction as an artilleryist. In March, 1776, though yet but 19 years of age, he obtained, on the recommendation of Gen. Schuyler, then in command of the northern department, a commission as captain in an artillery company raised by the state of New York. The main

body of the continental army, lately employed in the siege of Boston, had now arrived at New York, which it was expected would be the next object of attack. The mind of the young artillery captain was not, however, wholly absorbed in military matters; in the pay book of his company, which still exists, are notes which show that he was revolving in his thoughts the subject of currency, commerce, the collection of taxes, and other questions of political economy. In the campaign which followed, Hamilton bore an active part. It soon became necessary to abandon New York, and Washington retired to the upper part of the island on which that city stands. It was here that Hamilton, while employed in the construction of an earthwork, first attracted the attention of the commander-in-chief, who invited him to his quarters. Hamilton's artillery formed a part of the detachment of 1,600 men posted at Chatterton's hill, the attack upon which by the British is commonly known as the battle of White Plains. He shared in the retreat through New Jersey, and his guns helped to check the advance of Cornwallis, who with greatly superior force came upon the retreating troops as they were crossing the Raritan. He also took part in the battles of Trenton and Princeton, by all which hard service his company was reduced to 25 men. The spirit and ability of the young captain of artillery had not escaped notice. He had received invitations from two major generals to take a place in their staff. These he declined; but he accepted a similar offer from Washington, and on March 1, 1777, was announced in orders as aide-de-camp to the commander-in-chief with the rank of lieutenant colonel. What Washington most wanted in his aides-de-camp was competent assistance in the multifarious correspondence which he was obliged to carry on with congress, the governors of the states, the officers on detached service, and in regard to the exchange of prisoners and other subjects with the British commander-in-chief. He required somebody able to think for him, as well as to transcribe and to execute orders; and so much did he rely on Hamilton's judgment as to employ him, young as he was, in the most delicate and confidential duties. After the battles of Brandywine and Germantown, in which Hamilton took an active part, he was despatched on a confidential mission to Putnam and Gates, to hasten forward the reinforcements which those officers after the surrender of Burgoyne's army had been directed to send to Washington. These orders they had been in no hurry to execute, and it required a good deal of firmness on Hamilton's part to accomplish the object of his mission. He spent the following winter in the camp at Valley Forge. He was present at the battle of Monmouth, June 28, 1778, an attack which, in common with Greene, Wayne, and Lafayette, he had strongly favored, notwithstanding the opinion of Lee to the contrary. Of the challenge

which his fellow aide-de-camp Laurens sent to Lee, growing out of the incidents of that day, Hamilton was the bearer, and he acted as second to Laurens in the duel which followed. When Admiral D'Estaing arrived at Sandy Hook, Hamilton was sent by Washington to confer with him, and to make the arrangement which resulted in the attack on Rhode Island. His courtesy and tact made a very favorable impression on the French admiral. When in the autumn of the next year D'Estaing reappeared on the southern coast, Hamilton was again sent to express to him the views and wishes of Washington. He was at West Point at the time of the discovery of Arnold's treason, and strongly urged a compliance with André's last request to be shot. At the close of the year 1780 he married Eliza, the second daughter of Philip Schuyler, and by this alliance with a wealthy and influential family established for himself a permanent hold upon the state of New York. Shortly afterward he resigned his position as a member of Washington's staff. A rebuke from Washington which he thought unmerited was answered on the spot by a resignation, which he declined to withdraw, though Washington sent him an apology. But this separation did not interrupt their mutual confidence and esteem. He subsequently obtained a position in the line of the army as commander of a New York battalion, and in that capacity was present at the siege of Yorktown, where he led in the attack and capture of one of the British outworks, Oct. 14, 1781. The rest of the autumn and the winter he spent with his father-in-law at Albany, where he began to study law. After a few months' study he obtained at the July term of the supreme court, 1782, a license to practise. A few days later he was elected by the legislature of New York a delegate to the continental congress, and took his seat in November following. During the year that he sat in this body Hamilton bore an active part in the proceedings relating to the settlement with the officers of the army as to their half pay, the treaty of peace, and attempts to provide means of meeting the public debt. He had become fully satisfied of the necessity of giving increased authority to congress, and before his election had drafted a resolution which the New York legislature adopted, urging an amendment of the articles of confederation having that end in view. The city of New York having been evacuated by the British, he resigned his seat in congress, removed thither, and commenced the practice of the law. An act had been passed by the New York legislature just before, disqualifying from practice all attorneys and councillors who could not produce satisfactory certificates of attachment to whig principles; most or all the old city lawyers fell within this prohibition, which remained in force for three or four years, and enabled Hamilton and other young advocates to enter immediately on a run of practice which otherwise they might not have obtained so speedily.

There existed indeed in the New York legislature a very bitter feeling against the tories. Another act levelled against them, known as the "Trespass Act," gave occasion to a suit in which Hamilton early distinguished himself. This act authorized the owners of buildings in the city of New York, who had abandoned them in consequence of the British possession of the city, to maintain suits for rent against the occupants, notwithstanding the plea on their part that the buildings had been held under authority from the British commander. Being retained by the defendant in one of these suits, Hamilton made an elaborate plea, in which he maintained that whatever right might be given by the statute, the treaty of peace and the law of nations extinguished it. Though the popular sentiment was strongly against him, he prevailed with the court, whose decision was of the more consequence as there were many other cases depending on the same principle. The decision was denounced by a public meeting in the city; and the legislature, without waiting the result of an appeal, passed resolutions censuring the court. Hamilton defended his views in two pamphlets, and the spirit as an advocate and ability as a lawyer which he displayed in this case secured him at once a multitude of clients. He took an active part in establishing the bank of New York, the first institution of the kind in the state and the second in the Union, and was appointed one of its directors. He was one of the founders of the manumission society, the object of which was the abolition of slavery, then existing in the state of New York. By appointment of the state legislature he attended in 1786 the convention at Annapolis, and as a member of it drafted the address to the states which led to the convention the next year by which the federal constitution was framed. Having been chosen a member of the legislature of New York, he vainly urged the concession to congress of power to collect a 5 per cent. import duty, and the repeal of all state laws inconsistent with the treaty of peace. In the settlement of the long pending controversy between New York and Vermont, and the acknowledgment of the independence of Vermont by New York, he was more successful. Though the prevailing party in the New York legislature was little inclined to any material increase of the authority of the federal government, Hamilton was appointed one of the delegates to the convention to revise the articles of confederation, which met at Philadelphia, May 14, 1787. He had, however, two colleagues, Robert Yates and John Lansing, who together controlled the vote of the state, of decidedly opposite opinions. Two projects were brought forward in that body, one known as the Virginia plan, which contemplated the formation of a national government with an executive, legislature, and judiciary of its own, the basis of the constitution actually adopted; the other known as the New Jersey plan, which was

little more than an amendment in a few particulars of the existing confederation. In the course of the debate on these two plans, Hamilton delivered a very elaborate speech. As between the two plans, he preferred that which went furthest, though he doubted if even that was stringent enough to secure the object in view. He offered a written sketch of such a frame of government as he would prefer, not for discussion, or with the idea that in the existing state of public sentiment it could be adopted, but as indicating the mark to which he would desire to approach as near as possible. This scheme included an assembly to be elected by the people for three years; a senate to be chosen by electors chosen by the people, to hold office during good behavior; and a governor chosen also for good behavior by a similar but most complicated process. The governor was to have an absolute negative on all laws, and the appointment of all officers, subject to the approval of the senate. The governors of the states were to be appointed by the general government, and were to have a negative on all state laws. The power of declaring war and of ratifying treaties was to be vested in the senate. He insisted on the necessity of establishing a national government so powerful and influential as to create an interest in its support extensive and strong enough to counterbalance the state governments, and to reduce them to subordinate importance. Upon the adoption of the Virginia scheme his New York colleagues abandoned the convention in disgust. He too was absent for some time on business in New York, but returned again to the convention, and, though the constitution as reported by the committee of detail failed to come up to his ideas of energy and efficiency, he exerted himself to perfect it. He was one of the committee for revising its style and arrangement, and warmly urged its signature by the delegates present as the best that could be had. There still remained the not less serious and doubtful task of procuring for the constitution the consent and ratification of the states. The convention adjourned Sept. 17. On Oct. 27 there appeared in a New York journal the first number of a series of papers entitled "The Federalist," in support of the constitution against the various objections urged to it. These papers continued till the following June, reaching the number of 85, were republished throughout the states, and made a strong impression in favor of the new scheme of government. Five of them were written by Jay, fourteen by Madison, three by Madison and Hamilton jointly, and the rest by Hamilton. They are still read and quoted as a standard commentary on the ends and aims of the federal constitution and its true interpretation. In the convention of New York, of which Hamilton was a member, he sustained the constitution with zeal and success. The government having been put into operation under it, and congress at its first session having

passed acts reorganizing the executive departments, Washington in 1789 selected Hamilton as secretary of the treasury. At the ensuing session Hamilton presented an elaborate report on the public debt and the reestablishment of the public credit. That debt was of two descriptions, loans obtained abroad, and certificates issued for money lent, supplies furnished, and services rendered at home. As to the foreign debt, all agreed that it must be met in the precise terms of the contract. As to the domestic debt, the certificates of which had largely changed hands at a great depreciation, the idea had been suggested of paying them at the rates at which they had been purchased by the present holders. The report of the secretary took strong ground against this project. He considered it essential to the reestablishment of the public credit that the assignees of the certificates should be considered as standing precisely in the place of the original creditors; and the funding system which he proposed, and which was carried in the face of a strong opposition, was based on this idea. Another part of the system not less warmly opposed was the assumption of the debts contracted by the states in the prosecution of the late war. At the next session he proposed two other measures, both of which encountered a not less earnest resistance—an excise duty on domestic spirits, and a national bank with a capital of \$10,000,000. At the first session of the second congress Hamilton presented an elaborate report on the policy of having regard in the imposition of duties on imports to the protection of domestic manufactures, with an answer to the objections made against it—a summary of the arguments on that side of the question to which subsequent discussion has added little. The success of the funding system and the bank gave Hamilton a strong hold upon the moneyed and mercantile classes, but they also raised against him a very bitter opposition, which extended even to the cabinet, Mr. Jefferson, the secretary of state, strongly sympathizing with it. Both the funding system and the bank were denounced as instruments of corruption dangerous in the highest degree to the liberties of the people, and Hamilton as designing to introduce by their means aristocracy and monarchy. Charges of this sort, constantly iterated in a newspaper edited by a clerk in the state department, drew out from Hamilton a newspaper article under the signature of "An American," in which he charged upon Jefferson the instigation of these attacks, and urged the inconsistency of Jefferson's holding a place in an administration the policy of which he assailed. At the next session of congress a violent attack was made by Mr. Giles of Virginia upon the management of the treasury department. He moved nine resolutions of censure, but Hamilton sent in a triumphant reply, and the proceedings proved a total failure. The breaking out of the war between England and France in 1793, by raising new questions

as to the policy to be pursued toward the belligerents, aggravated the differences between Hamilton and Jefferson. Hamilton favored the policy of a strict and exact neutrality, and the right of the president to assume that position; and he defended his views in print under the signature of "Pacificus." Jefferson, finding Hamilton's influence predominant in Washington's cabinet on this question as on others, finally retired from it. The opposition to the excise law having proceeded in western Pennsylvania to the extent of armed resistance, it became necessary to call out a force to repress it; this operation was successfully conducted under Hamilton's eye in the autumn and winter of 1794. Having procured the adoption by congress of a system for the gradual redemption of the public debt, and finding his salary insufficient for his support, after six years' service, Hamilton resigned his office, Jan. 31, 1795, and resumed the practice of the law in New York. He still remained, however, a warm supporter of Washington's administration. On the question of the ratification of Jay's treaty, by which the country was soon after greatly shaken, he gave effectual aid to the president's policy of ratifying the treaty in a series of essays signed "Camillus." In the preparation of Washington's "Farewell Address," Hamilton's assistance was asked and given, precisely to what extent has been and still is a matter of controversy. About the time of Adams's accession to the presidency, the charges against Hamilton of misbehavior as secretary of the treasury were renewed in a new and aggravated shape. While Giles was hunting up matter for his abortive resolutions some opposition members of congress, of whom Monroe was one, had fallen in with two persons named Clingman and Reynolds, who intimated that they were in possession of secrets very damaging to Hamilton's character. By way of confirmation Reynolds exhibited some notes in Hamilton's handwriting as proving a confidential correspondence between them. Under the idea that they had discovered a connection between Reynolds and Hamilton for speculation in public securities, in which while at the head of the treasury Hamilton could not legally engage, Monroe and his companions waited upon Hamilton to ask an explanation. He speedily convinced them, by the production of other letters, that the correspondence between himself and Reynolds had grown entirely out of an intrigue with Reynolds's wife, into which he had been entrapped. Though Monroe and his associates admitted that their suspicions of official misconduct were wholly removed, Monroe preserved certain memoranda of their interview with Reynolds, Clingman, and Hamilton; and these, having come by some unexplained means into the hands of Callender, a pamphleteer of the opposition, were published, with the intimation (based on an opinion expressed by Clingman, in a conversation with Monroe after

the interview with Hamilton, Monroe's memorandum of which was not communicated to him) that the alleged intrigue was a falsehood invented by Hamilton and sustained by forged letters and receipts to cover up his illegal stock speculations. After a sharp correspondence with Monroe, whose explanations as to his memorandum and the credit he attached to it were not satisfactory, Hamilton published a pamphlet containing not only the correspondence with Monroe, but that also which he had exhibited to Monroe and his associates; a step into which he considered himself forced by the position assumed by Monroe. The difficulties with France consequent upon the ratification of Jay's treaty soon reached a point little short of war. A French invasion was apprehended. In the summer of 1798 additions were made to the regular army, further additions were provisionally authorized, and Washington was appointed commander-in-chief with the title of lieutenant general. He accepted with the understanding that he should not be called into active service except in the event of hostilities, and on the condition that Hamilton should be major general, thus throwing upon him the details of the organization of the army. While thus engaged Hamilton wrote in defence of the policy which had led to these military preparations. On the death of Washington, Dec. 14, 1799, Hamilton succeeded to the command in chief; but satisfactory arrangements having been made with France, the army was soon disbanded and he resumed the practice of law in New York. The appointment made by Adams, in September, 1799, of a new embassy to France contrary to the advice of his cabinet, was strongly disapproved by the more ardent federalists, and among others by Hamilton. This produced a breach in the federal party; but Hamilton and his friends, considering the strong influence of Adams in New England, could not venture openly to oppose his reelection as president. The most they could do was to endeavor by a secret understanding to secure a greater number of votes for the other candidate who might be placed on the federal ticket; candidates being voted for, as the constitution then stood, without designating whether for president or vice president, the first office falling to him who had the highest vote. Whether the federalists would be able to command a majority of the electoral votes seemed likely to depend on the political complexion of the legislature of New York, and that in its turn on the character of the delegation from the city of New York. To secure that delegation, Hamilton on the one side and Aaron Burr on the other made every possible exertion. Burr, who was a master of the arts of political intrigue, succeeded in carrying the day. Shortly after this election the breach in the federal party became fully apparent. Adams dismissed the chief members of his cabinet, whom he accused of being under Hamilton's influence and belonging with him to a British faction. Hamilton in his turn

printed a severe criticism on Adams's political character, intended for private circulation among the leading federalists, but of which the publication became necessary in consequence of extracts from it which found their way into some of the opposition newspapers. The presidential election went against the federalists, but the result showed an equal vote for Jefferson and Burr. The federalists in the house of representatives (to which body it fell to decide between them), being strong enough to control or neutralize the vote of half the states, favored the election of Burr; but Hamilton, who entertained a very unfavorable opinion of Burr, remonstrated strongly against this attempt to make him president. In the trial in 1803 of Croswell for an alleged libel on Jefferson, he supported the doctrine that to publish the truth is no libel. The court charged against him, and the jury gave an adverse verdict; but the doctrine which he maintained was adopted by the legislature in 1805, and has since prevailed throughout the United States. Burr, having lost the confidence of his party, and being unable to obtain a renomination as vice president, sought to be elected governor of New York. He hoped to receive the support of the federalists, then in a minority and unable to elect any candidate of their own. Hamilton's opinion of Burr had undergone no change, and at a federal caucus he warmly opposed the project of supporting him for governor. He took no active part in the election, but his opinions were frequently quoted by those who did. Burr was defeated by Morgan Lewis, as he believed, through Hamilton's instrumentality, and became eager for vengeance. He called on Hamilton to disavow having used pending the election any expressions derogatory to his personal honor, and finally challenged him. This challenge was accepted by Hamilton, but not in the spirit of a professed duellist. The practice of duelling he utterly condemned; indeed, he had himself already been a victim to it in the loss of his eldest son, a boy of 20, in a political duel in 1802. This condemnation he recorded in a paper which under a premonition of his fate he left behind him. It was in his character of a public man that he accepted the challenge. "The ability to be in future useful," such was his own statement of his motives, "whether in resisting mischief or affecting good in those crises of our public affairs which seem likely to happen, would probably be inseparable from a conformity with prejudice in this particular." The meeting took place, July 11, 1804, at Weehawken on the Hudson opposite New York, and at the first fire Hamilton received a wound of which he died the next day.—The object alike of bitter hatred and of the warmest admiration, Hamilton enjoyed among his contemporaries, both friends and foes, a reputation for extraordinary ability, which he still retains. He was under the middle size, thin in person, and very erect, courtly, and dignified in his

bearing. His figure, though slight, was well proportioned and graceful. His complexion was very delicate and fair, his cheeks rosy, and the whole expression pleasing and cheerful. His voice was musical, his manner frank and cordial. He excelled equally as a writer and a speaker. His widow survived him 50 years, having died in 1854 at the age of 97. His son John C. Hamilton wrote his life (2 vols. 8vo, 1834-'40), edited his works from MSS. in the state department (7 vols., 1851), and also compiled an elaborate work in several volumes under the title of "History of the Republic of the United States, as traced in the Writings of Alexander Hamilton and his Contemporaries" (1850). See also "A Collection of Facts and Documents relative to the Death of Major General Hamilton," by W. Coleman (1804); "Official Reports" (1810); his life by James Renwick (1841); "Official and other Papers," edited by Francis L. Hawks (1842); and "Hamilton's Conduct as Secretary of the Treasury Vindicated," by J. A. Hamilton (1870).

HAMILTON, Count Anthony, a French writer, born in Ireland about 1646, died at St. Germain-en-Laye in 1720. He belonged to an illustrious Scotch family, and on the death of Charles I. was taken to France, where he received his education. On the restoration of Charles II. he returned to England, and was presented at court, but, being a Catholic, received no official appointment. James II. gave him the command of an infantry regiment in Ireland and the government of Limerick. In 1688 he accompanied the exiled king to France, and remained one of his faithful courtiers. During this period he wrote his spirited works, which still hold a place in French literature. The best known, *Les mémoires du comte de Gramont* (1713), is a narrative of the licentious life of his brother-in-law, and a faithful picture of the court of Charles II. of England. He left also a series of tales, written to burlesque the then recently published "Arabian Nights": *Le béliar*, *Fleur d'épine*, *Les quatre Facardins*, and *Zénéide*, first published in 1749, and several miscellaneous light poems. The *Mémoires* have been frequently translated in England, one of the best editions being that published by Bohn with notes and illustrations by Sir Walter Scott, and including the personal history of Charles and the Bosobel tracts (1853). Hamilton's tales, under the title of "Fairy Tales and Romances," have also been translated into English (1849). The best French edition of his complete works is by Renouard (3 vols., Paris, 1812).

HAMILTON, Elizabeth, an Irish authoress, born in Belfast, July 25, 1758, died at Harrogate, England, July 25, 1816. She spent considerable time in Scotland, as governess in the family of a Scottish nobleman, and some of her most interesting works sprang from the friendships which she formed and the observations which she made in that country. Among these are her "Letters on the Formation of Religious

and Moral Principle" (2 vols. 8vo, London, 1806), addressed to the eldest of her pupils, and her "Cottagers of Glenburnie" (1808), a tale illustrative of the habits of the Scottish peasantry of that day. The most important of her other works are: "Letters of a Hindoo Rajah, written previous to and during the Period of his Residence in England" (2 vols., 1796), a fictitious work describing English manners; "Memoirs of Modern Philosophers" (3 vols., Bath, 1800); "Letters on the Elementary Principles of Education" (2 vols., 1801-'2); "Memoirs of the Life of Agrippina the Wife of Germanicus" (2 vols., London, 1811); and "Popular Essays on the Understanding, Imagination," &c. (2 vols., 1845).

HAMILTON, Gavin, a Scottish artist, born at Lanark about 1730, died in Rome in 1797. At an early age he went to Rome, where he studied painting. He spent the latter part of his life exploring the neighborhood of Rome for ancient monuments and statues, which he bought and sold, and of which he made a large and valuable collection, now in the Towneley gallery of marbles in the British museum. He published "The Italian School of Painting," with 40 superb plates (fol., London, 1773).

HAMILTON, James, an American statesman, born in Charleston, S. C., May 8, 1786, drowned at sea near the coast of Texas, Nov. 15, 1857. He was educated for the bar, but entered the army and served as a major in the Canadian campaign of 1812, and afterward resumed the practice of the law. For several successive years he was mayor of Charleston, and he was active in the detection of a formidable conspiracy in 1822 among the negro population, led by Denmark Vesey, a free mulatto from Hayti. In the same year he was elected to the state legislature, and was also chosen a representative in congress, where he became prominent by his opposition to the protective system. While in congress he acted as second to John Randolph in his duel with Henry Clay. He was also second to Gov. McDuffie in his duel with Col. Cummings. Jackson, on his election as president in 1828, offered him the post of secretary of war, and afterward that of minister to Mexico, with authority to negotiate the annexation of Texas, both of which he declined. In 1830-'32 he was governor of South Carolina, and recommended to the legislature the passage of the nullification act, which he supported in numerous essays and speeches. His successor, Gov. Hayne, appointed him to the command of the state militia. Some time afterward he became interested in the affairs of the republic of Texas, and in 1841 was her minister to England and France, where he procured the recognition of her independence; and in 1845 he was active in aiding her admission to the Union. On the death of Calhoun in 1850, he was appointed his successor in the United States senate, but for domestic reasons he declined the office. He had expended his fortune in the service of

Texas, and was on his way thither to seek indemnification when he perished in a collision of steamboats. With his usual courtesy and generosity he yielded his own chance of safety to a lady among the passengers, to whom he was a stranger. At the time of his death he was United States senator elect from Texas.

HAMILTON, Robert, a Scottish mathematician born in Edinburgh about 1742, died in Aberdeen, July 14, 1829. In 1766 he became so favorably known as a mathematician that, although but 23 years of age, he was induced to offer himself as a candidate for the mathematical professorship of Marischal college, Aberdeen. He was unsuccessful in this instance, but three years later was appointed rector of the academy at Perth. In 1779 the chair of natural philosophy in Marischal college was presented to him, and the year after he exchanged it for the professorship of mathematics. His "Inquiry concerning the Rise and Progress, the Redemption and Present State, and the Management of the National Debt of Great Britain" (1813), was the first important attempt to overthrow the sinking fund system, which had for many years been considered an axiom in financial science. Hamilton's views were subsequently adopted by the eminent political economists of the day. His remaining works are: "Introduction to Merchandise" (2 vols. 8vo, Edinburgh 1777-'9); "Arithmetic and Bookkeeping" (London, 1788); "The Progress of Society," a posthumous work (1830); essays on "Peace and War," "Rent," &c.

HAMILTON, William, a Scottish poet, born at Bangour, Ayrshire, in 1704, died in Lyons, France, March 25, 1754. He was living a life of literary leisure when the young pretender raised the standard of revolt in 1745. He at once joined the cause, and celebrated the victory of Preston Pans in his stirring ode "Glads-muir." After the battle of Culloden he fled to the highlands, and made his escape to France. His friends soon procured a royal pardon for him, and he returned to Scotland; but he soon went to southern France on account of his health, and for several years previous to his death he resided at Lyons. His ballad of "The Braes of Yarrow" is the best known of his effusions. A pirated edition of his poems first appeared in Glasgow (1748); after his death a complete edition was printed from his own manuscripts (Edinburgh, 1760).

HAMILTON. I. Sir William, a British antiquary, born in Scotland in 1730, died in London, April 6, 1803. He was of good family, and a foster brother of George III., but poor, beginning life, as he said, with £1,000. In 1755 he married a wealthy lady, and was enabled to pursue his favorite studies in art, natural philosophy, and literature. In 1764 he was appointed English ambassador to Naples, and from his arrival in that country applied himself to collecting and illustrating the art relics with which it abounds. He was among

the first of those to whom the British public are indebted for a comprehensive knowledge of Greek, and especially Etruscan antiquities, having made a large collection, which was purchased for the British museum. He lost his wife in 1782, and in 1784 made a voyage to England, to hinder his nephew from marrying Emma Harte; he himself, however, took her back to Italy and privately made her his wife, but did not publicly present her as such till 1791, in which year he was appointed privy councillor. In 1793 he effected a treaty of alliance between the courts of St. James's and Naples, but much of the political management at the latter court in those eventful times is attributed to the influence of his wife and Lord Nelson. He contributed largely toward aiding Father Piaggi in unrolling manuscripts found in Herculaneum. He was recalled to England in 1800, at which time he lost by shipwreck a large collection of antiques, of which however drawings were preserved and published. A claim of Sir William on the British government for special services was disallowed, and he died in comparative poverty. His works are: *Antiquités étrusques, grecques et romaines, tirées du cabinet de M. Hamilton* (4 vols. fol., Naples, 1766); "Observations on Mount Vesuvius, Mount Etna," &c. (London, 1772); *Campi Phlegrei* (2 vols. fol., Naples, 1776-'7, with supplement in 1779 giving an account of the eruption of Vesuvius); and *Lettera sul Monte Volture* (Naples, 1780). Ten of his papers upon various Italian subjects were published in the "Philosophical Transactions" (1767-'95).

Many of the marbles of the Towneley gallery in the British museum were collected by him. **II. Emma Lyon**, alias HARTÉ, afterward Lady Hamilton, wife of the preceding, born according to some in Wales, according to others in Cheshire, about 1760, died near Calais, France, in 1815. She was the illegitimate child of a servant girl, and at the age of 13 was employed to take care of the children of a brother-in-law of the engraver Boydell. When 16 years old she was shop girl for a mercer in London, and afterward chambermaid to a lady of rank. She then became waiter in a tavern frequented by literary men, painters, actors, and artists. While here, learning that a young sailor, her cousin, had been pressed into the navy, Emma went to his captain, John Willett, to beg for his release. The captain let the cousin go, but kept the girl as his mistress. This illicit union continued for several years, during which time she acquired an excellent education. Willett, eventually becoming weary of the connection, gave her to a friend, who however quarrelled with her at the end of a month and left her in extreme poverty. A noted quack named Graham had contrived a bed of Apollo, or "celestial bed," on which, in a delicately colored light, an exquisitely beautiful woman, nearly naked, was gradually unveiled to soft music as Hygiea, the goddess of health. Graham engaged Emma for the part of the goddess, in

which she created a great sensation. Among her many conquests she soon made that of Charles Greville, of the ancient family of Warwick. By him she had three children, and fascinated him to such a degree that he determined to marry her, and would have done so but for the opposition of his uncle, Sir William Hamilton. But so soon as the latter beheld her, he in turn was fascinated. A contract was now made between uncle and nephew by which it was agreed that Emma should be transferred to the former, and that he should pay the debts of his nephew. At first his mistress, she soon blinded her new lover so completely as to become his wife, and was presented as such by him to Queen Caroline of Naples in 1791, by whom she was received into intimacy and confidence. Her extraordinary talents for political as well as personal intrigue here found a wide field for action. She soon formed an illicit connection with Lord Nelson, which her husband for expediency's sake tacitly encouraged. At this time the kingdom of Naples was critically situated, a French invasion being dreaded, while on the other hand fears were entertained lest England should ruin its trade. Charles IV. of Spain having written to his brother, the king of Naples, violently accusing the English, this letter was shown by the queen to Lady Hamilton, by whom it was sent to the British cabinet. The result was that England attacked the Spaniards, and a vast loss of lives and of treasure to the latter was caused by the violated confidence. In 1798 the arrival of the French suddenly interrupted the festivities in honor of Nelson's victory at Aboukir. A panic ensued, and the royal family, with Sir William and Lady Hamilton, took refuge in Nelson's ship, which conveyed them to Palermo. When the court returned to Naples, merciless vengeance was taken on revolutionists and liberals, and of this Lady Hamilton availed herself to punish personal enemies, Nelson's violent measures, contrary to the articles of capitulation, having been incited by her. Having returned with her husband to England, Lady Hamilton found herself generally despised on account of her relation to Nelson, who had resigned his command to enjoy her society. In England she gave birth to a daughter, whom she named Horatia Nelson, and resided at a country seat which Nelson had given her. After the death of her husband, and especially after that of Nelson in 1805, she was destitute, and left England for France, where she died in want and misery. Her daughter Horatia married a poor clergyman, and some funds were raised by subscription for the benefit of their children.

HAMILTON, Sir William, a Scottish philosopher, born in Glasgow, March 8, 1788, died in Edinburgh, May 6, 1856. At the university of Glasgow he took a high position in the classes, and carried off the first prizes in philosophy. From Glasgow he went to Balliol college, Oxford, where candidates for honors

were required to profess a certain number of books in history, poetry, and science. In going up for his degree, he not only took with him into the schools far more than the usual average of books in poetry and history, but in science he professed all the works extant in Greek and Roman philosophy, including the whole of Aristotle and all the works of his earlier commentators, all of Plato, the Neo-Platonists, Proclus, and Plotinus, and the fragments of the earlier and later philosophical doctrines preserved by Laërtius, Stobæus, and the other collectors. His examination in philosophy occupied two days, running through six hours each day. In 14 of his books on Greek philosophy he was not questioned, the greater part of these being declared by the masters to be too abstrusely metaphysical for examination. At this time also he had studied the earlier modern philosophers and become interested in the speculations of contemporary metaphysicians on the continent. He was admitted to the bar at Edinburgh in 1813, and began to practise as an advocate; but his time was given more to philosophical studies than to his profession. In 1816 he established his claim to a dormant baronetcy. In 1820 he was a candidate for the chair of moral philosophy in the university of Edinburgh; but his competitor John Wilson, being a tory, was elected. In 1821, by appointment of the faculty of advocates, Hamilton delivered in the university a short course of lectures on the character and history of the classic nations of antiquity. At this time phrenology was exciting especial interest in Edinburgh. For the purpose of testing its pretensions Sir William went through a laborious course of comparative anatomy, dissecting with his own hands several hundred different brains. He sawed open a series of skulls of different nations, of both sexes and all ages, to ascertain the facts in regard to the frontal sinus on which the phrenologists had founded so much. He also instituted a series of experiments for ascertaining the relative size and weight of brains. The results of these investigations were embodied in two papers which he read before the royal society of Edinburgh in 1826, maintaining that the assertions of fact by the phrenologists were utterly false. In 1829 he contributed to the "Edinburgh Review" a powerful article against the German doctrine of human omniscience, as set forth after Schelling and Hegel, though in modified form, in the lectures of Victor Cousin. This was followed by other contributions to the same review, two of which are particularly celebrated, "On the Philosophy of Perception" and "On Recent Publications in Logical Science." Many of these articles were translated into foreign languages, and in 1852 all of them were published collectively, edited by their author with notes and appendices, under the title "Discussions in Philosophy and Literature, Education, and University Reform" (enlarged ed., 1854; re-

published, with an introductory essay by Robert Turnbull, D. D., New York, 1855). In 1836 Sir William was elected professor of logic and metaphysics in the university of Edinburgh; and then began a new era in his life and in the academic life of Scotland. He entered upon his professorship with every qualification. His personal appearance was the very finest. Above the middle height, of a sinewy and well compacted frame, with a massive head, decisive and finely cut features, a dark, calm, piercing eye, perfect self-possession and reliance, finished courtesy of manners, and a voice remarkably distinct, silvery, and melodious, he stood before his hearers the perfection of a man in every physical adornment. "Whatever," says Mr. Baynes, his class assistant, "the previous expectations of Sir William's appearance might be, they were certainly realized if not surpassed; and however familiar one might afterward become with the play of thought and feeling on that noble countenance, the first impression remained the strongest and the last—that it was perhaps altogether the finest head and face you had ever seen, strikingly handsome, and full of intelligence and power. When he began to read, Sir William's voice confirmed the impression his appearance and manner had produced. It was full, clear, and resolute, with a swell of intellectual ardor in the more measured cadences, and a tone that grew deep and resonant in reading any striking extracts from a favorite author, whether in prose or poetry—from Plato or Pascal, Lucretius or Virgil, Scaliger or Sir John Davies, whose quaint and nervous lines Sir William was fond of quoting." He had methodized all his views on logic and metaphysics, and in his lectures he now put them into an admirable form for academic instruction. He disciplined his pupils by severe examinations and in the writing of essays, which excited the most intense mental activity. In 1846 Sir William published his edition of Reid's works, which was undertaken ten years before, as a book for the use of his class. It made a profound impression in Scotland, and Lord Jeffrey, in a letter to the editor of the "Edinburgh Review," expressed his admiration of "the immensity of its erudition, its vigor, completeness, and inexorable march of ratiocination." His last literary labor was an edition of the works of Dugald Stewart, in nine volumes, with a life of Stewart by Mr. John Veitch, one of his pupils. For ten years he had been enfeebled by a severe paralysis, but had never relaxed his labors as a teacher, and only lessened them as an author. He finished his lectures of the session of 1855 and 1856, and distributed the prizes to his class; and after an illness of ten days he died at his residence in Great King street.—As a metaphysician Hamilton stands among the greatest. His disquisition on the *Epistola Obscurorum Virorum* gave an example which astonished even the Germans; his polemic against phrenology, in the several papers

appended to the first volume of his "Lectures," is a wonder of experimental sagacity; and his immense erudition has quickened the scholarship of the world. The most important of his writings, next to those on philosophy, are his papers on educational reform. In one of these he made a powerful attack on Whewell's theory that mathematics is a better logical discipline than logic itself. Sir William Hamilton's philosophy, though it professes to be little more than an elucidation and elaboration of Reid's, is universally recognized and treated as his own. It accepts consciousness as an infallible witness, and therefore declares, in opposition both to idealism and to the doctrine of representative perception, that there is in reality an external world, and that we have an immediate perception of that world; it teaches also that the highest speculation is within the comprehension of this philosophy of common sense, and that there is a moral universe, known to us through our moral nature, which implies a moral order and a moral governor of all.—Many of Hamilton's notes are included in the abridgment of Reid's "Essays on the Intellectual Powers" by Dr. James Walker (Cambridge, 1850). A selection from his writings by O. W. Wight, entitled "The Philosophy of Sir William Hamilton," was published in New York in 1853, and "Metaphysics of Sir William Hamilton," edited by Prof. Francis Bowen, in Cambridge in 1861. A selection of his academic lectures, edited by Mansel and Veitch, was published in 4 vols. in 1859-'61.—See "Memoir of Sir William Hamilton," by John Veitch (Edinburgh, 1869), and "Examination of the Philosophy of Sir William Hamilton," by John Stuart Mill (2 vols., London, 1865).

HAMILTON, William Gerard, an English statesman, born in London in January, 1729, died there, July 16, 1796. He was educated at Westminster school and Oxford university, and in 1754 entered parliament as member from Petersfield, Hampshire. On Nov. 13 of the succeeding year he delivered the famous speech which earned him his well known sobriquet of "Single-Speech Hamilton." Of this speech no copy was ever taken. Contrary to the belief long entertained that this was his solitary oratorical effort, he spoke again in parliament in the succeeding February, and afterward at least twice in the Irish parliament. From 1761 to 1784 he held office in Ireland as principal secretary of the lord lieutenant and as chancellor of the exchequer. A posthumous work by him was published by Malone, entitled "Parliamentary Logic" (London, 1808).

HAMILTON, William Richard, an English archaeologist, born Jan. 9, 1777, died July 11, 1859. His university education was interrupted by ill health. In 1799 he became secretary to Lord Elgin in the embassy to Constantinople. He secured for the British museum the celebrated trilingual Rosetta stone, which, undaunted by the plague which had broken out among the crew, he seized on board of the ship

where the French had concealed it, and sent to London in 1802. He displayed the same zeal in regard to the Elgin marbles; having been on board of the vessel on which part of them were shipwrecked near Cerigo, he remained in that island several months, and with the assistance of skilful divers succeeded in rescuing those famous works of art from the sea. Soon after his return to England he published "Egyptiaca, or some Account of the Ancient and Modern State of Egypt" (royal 4to, London, 1810). From 1810 to 1822 he was under secretary of state for foreign affairs, and afterward was ambassador at Naples. While in Paris with Lord Castlereagh in 1815 he succeeded in bringing about the restoration to Italy of the works of art which the French had seized on various occasions.

HAMILTON, Sir William Rowan, a British philosopher, born in Dublin, Aug. 4, 1805, died at Dunsink, near Dublin, Sept. 2, 1865. He gave early indications of extraordinary intellectual powers, and when 13 years old he was in different degrees acquainted with 13 languages, including French, Italian, Spanish, German, Syriac, Persian, Sanskrit, Hindostanee, and Malay. At 14 years of age he addressed a letter of greeting in the Persian language to the Persian ambassador, Mirza Abu Hassan Khan. Falling in with a Latin copy of Euclid when 10 years old, he soon became interested in geometry, and at 12 he was fully confirmed in his taste for algebra. He studied the *Arithmetica Universalis* and the *Principia* of Newton, and the *Mécanique céleste* of Laplace, while in his 18th year, and about the same time entered upon his investigations in optics. In 1823 he entered the university of Dublin, where he at once gained the first place, and at every quarterly examination obtained the chief honor in science and the classics. In 1827, while still an undergraduate, he was appointed Andrews professor of astronomy in the university and astronomer royal of Ireland. In 1837 he was elected president of the royal Irish academy. The honor of knighthood was conferred upon him at the meeting of the British association for the advancement of science at Dublin in 1835, when Hamilton held the post of secretary and delivered the annual address. He engaged in numerous investigations on scientific subjects, published in the "Transactions" and "Proceedings" of the royal Irish academy and royal society, in the "Proceedings" of the British association, in the "London and Edinburgh Philosophical Magazine," &c. In 1828 he published in the "Transactions" of the royal Irish academy an "Essay on the Theory of Systems of Rays," which accomplished for optics what Descartes has done for geometry and Lagrange for mechanics; that is, the application of algebra, including the differential calculus, to those problems in the science of optics which spring from the hypothesis of transverse vibrations, or what is more generally called the undula-

tory theory of light. By a peculiar analysis, developed in this theory, he generalized the most complicated cases of common geometrical optics; and his prediction of the most singular and critical of all the results of Fresnel's theory, the conical refraction in biaxial crystals, amply rewarded his labors. Dr. Lloyd, of Trinity college, Dublin, verified this result in the case of aragonite, which is a biaxial crystal; he found the position, dimensions, and conditions of polarization of the emerging cone of light to be exactly such as Hamilton's prediction assigned. Airy has designated it as "perhaps the most remarkable prediction that has ever been made." For this discovery Sir William received the Cunningham gold medal from the royal Irish academy, and the royal gold medal of King William IV. from the royal society of London. In 1834 he published two papers in the "Philosophical Transactions" of the royal society, "On a General Method in Dynamics, by which the study of the motions of all free systems of attracting or repelling points is reduced to the search and differentiation of one central relation or characteristic function." The most elaborate of Hamilton's writings is his "Method or Calculus of Quaternions" (8vo, Dublin, 1853), which formed the subject of successive courses of lectures delivered in 1848 and subsequent years at Trinity college. He aimed in this to show that "expressions which seem, according to common views, to be merely symbolical and quite incapable of being interpreted, may pass into the world of thoughts, and acquire reality and significance, if algebra be viewed, not as a mere art or language, but as the science of pure time." The fundamental geometrical view, adopted and developed in the "Lectures," is that according to which a quaternion is considered as the quotient of two directed lines in tridimensional space; and the motive (in this view) for calling such a quotient a quaternion, or the ground for connecting its conception with the number four, is derived from the consideration, that while the relative length of the two lines compared depends only on one number, expressing their ratio, their relative direction depends on a system of three numbers—one denoting the angle between the two lines, and the two others determining the aspect of the plane of that angle, or the direction of the axis of the positive rotation in that plane. His "Elements of Quaternions" appeared in 1866.

HAMILTON COLLEGE, an institution of learning at Clinton, Oneida co., N. Y., 9 m. S. of Utica. Its origin is due to the generosity of the Rev. Samuel Kirkland, who was a missionary for more than 40 years among the Oneida Indians, and died in 1808. In 1793 the "Hamilton Oneida Academy" was incorporated through the influence of Mr. Kirkland, who presented its trustees with the title deed to several hundred acres of land. This academy existed 18 years, and was very prosperous. With the rapid growth of settlements in its

neighborhood, the demand grew up for a higher institution, and Hamilton college was chartered in 1812. Dr. Azel Backus, a Congregational clergyman, distinguished in Connecticut as a preacher and scholar, was chosen the first president. He died in 1817, and his successor, Dr. Henry Davis, resigned in 1833. The third president, Dr. Sereno E. Dwight, a son of Timothy Dwight, president of Yale college, held the office two years, and the fourth, Dr. Joseph Penney, four years. Dr. Simcon North, a graduate of Yale college, was chosen president in 1839, after holding the classical professorship ten years. He was succeeded in 1858 by Dr. Samuel W. Fisher, also of Yale college. The seventh president, Dr. Samuel Gilman Brown, an alumnus of and for many years a professor in Dartmouth college, was elected in 1866.—The course comprises four years, at the end of which the degree of bachelor of arts is conferred. The academic year is divided into three terms of about 13 weeks each. Applicants for admission must be at least 15 years of age, and must pass an examination in Greek, Latin, mathematics, and the common English branches. In 1873-'4 there were 10 professors besides the president and college pastor, and 152 students. There are between 1,700 and 1,800 names upon the triennial catalogue. The law department was endowed by William H. Maynard, and has recently been enriched by the valuable law library bequeathed to it by William Curtis Noyes. The agricultural department was endowed by the late Silas D. Childs of Utica. The Litchfield observatory, endowed by E. C. Litchfield of Brooklyn, N. Y., and under the charge of Prof. C. H. F. Peters, who has discovered 20 asteroids here, has an equatorial telescope with an object glass 13.5 inches in diameter and a focal length of nearly 16 feet. Geological and mineral cabinets and collections in natural history are connected with the college, embracing more than 17,000 specimens. There is also an extensive collection of North American plants made by the late Dr. H. P. Sartwell. The college library contains more than 12,000 volumes. A new library building, capable of holding 60,000 volumes, has recently been erected at a cost of \$45,000. Under the same roof is also a memorial hall and art gallery, to contain tablets, portraits, and other memorials of the friends of the college. The college grounds comprise 45 acres, on which are grouped three four-story stone buildings devoted to lodging and recitation rooms, chapel, boarding house, hall for collections in natural history, gymnasium, chemical laboratory, observatory, library hall, and president's house. The real estate and collections are valued at \$300,000, and there are besides productive funds amounting to more than \$250,000.

HAMLET, or **Amlæth**, a prince of Denmark, whose name occurs in the mediæval histories, particularly that of Saxo Grammaticus, although nothing is known of the period when

he lived; some place it as early as five centuries B. C., others as late as A. D. 700. According to Saxo Grammaticus, in his *Danorum Regum Heroumque Historia*, published in 1514, Hamlet was the son of Horvendill, hereditary prince of Jutland, and of Gerutha, daughter of Roric, 15th king of Denmark after Danus. His story was republished with some modifications by a French writer named Belleforest, whose work, translated into English with the title of "Histoyre of Hamblet," undoubtedly fell under the eye of Shakespeare, who made it the basis of his "Hamlet," though with many alterations and additions. According to some historians, Hamlet was king of Denmark for several years; but many modern authorities suppose that no such person ever existed.

HAMLIN, an E. county of Dakota, recently formed and not included in the census of 1870; area, 720 sq. m. It is intersected by the Big Sioux river, and contains several lakes. The surface is mostly table land.

HAMLIN, Hannibal, an American statesman, born at Paris, Maine, Aug. 27, 1809. He was admitted to the bar in 1833, and continued to practise till 1848. In 1836 he was elected a member of the legislature, of which he was speaker from 1837 to 1840. In 1842 he was elected to congress as a democrat, and reelected in 1844; and in 1848 he was chosen to fill a vacancy in the United States senate, and in 1851 was elected for a full term of six years. In 1856 he withdrew from the democratic party, and was elected by the republicans governor of Maine; but he resigned that office on being reelected senator. In 1860 he was elected vice president of the United States. In 1865 he was appointed collector of the port of Boston, but soon resigned; and in 1869 he was again elected United States senator for the term expiring March 4, 1875.

HAMLIN, Leonidas Lent, an American clergyman, born in Burlington, Conn., May 10, 1797, died at Mt. Pleasant, Iowa, March 23, 1865. He was educated for the ministry of the Presbyterian church, but subsequently studied law, and was admitted to the bar at Lancaster, Ohio, in 1827. In 1830 he joined the Methodist Episcopal church, entered the ministry, and in 1840 was elected by the general conference assistant editor of the "Western Christian Advocate" (Cincinnati) and first editor of the "Ladies' Repository." He was a delegate to the general conference of 1844, when the slavery agitations resulted in the division of the church. Mr. Hamline was one of the committee of pacification or conference, and also was appointed upon the committee of nine to whom was intrusted the preparation of a plan of separation, and was himself the author of that plan. The argument which he then made on the right of the general conference to depose a bishop from office, for such good and sufficient reasons as it may determine, embodied the constitutional principles that have generally been accepted by the Methodist Episcopal church from that

time. At the same conference he was elected bishop, in which office he continued till 1852, when he resigned on account of ill health, in accordance with a principle that he had powerfully advocated in 1844, viz., that the episcopacy of the Methodist Episcopal church is not an order, but an office. From 1856 he resided at Mt. Pleasant. Bishop Hamline's writings are largely devoted to the defence and illustration of the Wesleyan doctrine of sanctification. A collection of them has been made by the Rev. F. G. Hibbard, D. D. ("Works," &c., 2 vols., New York, 1871), who had previously edited a volume of his sermons (Cincinnati, 1869).—See "Life and Letters of L. L. Hamline, D. D.," by W. C. Palmer (New York, 1868).

HAMM, a city of Westphalia, Prussia, at the junction of the Ahse with the Lippe, 20 m. S. S. E. of Münster; pop. in 1871, 16,914. As a point of military importance it suffered much during the thirty years' war. It was bombarded in 1761 and 1762 by the French, and dismantled in 1763. The old walls have been levelled and a promenade constructed in their place. It contains four churches, a gymnasium, manufactories of linen and other goods, tanneries, and a considerable trade. It is a central railway station between Hanover and Cologne.

HAMME, a town of Belgium, in the province of East Flanders, on the Durme, near its junction with the Scheldt, 17 m. E. by N. of Ghent; pop. in 1867, 10,142. The inhabitants are engaged in rope making and ship building, and there is a considerable trade in cloth and flax. In the neighborhood interesting antiquities have been discovered.

HAMMER, a tool for communicating force by impact. There are three varieties, those which are moved by the arm, those which are moved by their own gravity, and those which are moved by compressed steam or other power. The two latter kinds are called power hammers. The first kind comprises small or hand hammers, and sledges. The hand hammer consists of a head, to give momentum, and a small helve or handle fitted into an eye, which is usually in the middle of the head. Their weight varies from an ounce to one or two pounds. Sledges are large hammers, to be wielded by both arms, and vary in weight from 2 to 20 lbs. Large wooden hammers, bound with iron, used by woodsmen in driving wedges, are called beetles; smaller wooden hammers are called mallets.—Power hammers are of various forms, moved by water, steam, and sometimes by horse power. The common forge hammer is made of a heavy head of iron, 5 to 10 tons in weight, faced with steel, and having a helve of cast or wrought iron, or wood, the centre of motion being at the end of the helve. The hammer is raised by cams upon a wheel, the lifting force being applied near the head. The force of the blow is the momentum attained by the mass in falling through a height of from 16 to 24 in. The speed is usually from 50 to 100 strokes per

minute. Tilt hammers have much the same construction as the common forge hammer, except that the head is raised by depressing the opposite end of the helve by a cam wheel, as represented in fig. 1, the centre of motion being between the head and the point of application of power. They are lighter and move with greater rapidity, and are used for lighter kinds of work. Both kinds must be substantially supported by solid foundations. The steam forge hammer, in which steam is used as a propelling force to the hammer, patented by Mr. Nasmyth of England in 1842, and also by M. Creusot of France in the same year, is a much more efficient machine. Nasmyth's hammer is the one generally known. The hammer head is fixed to the end of a massive piston rod working vertically in a high-pressure steam cylinder, placed above, the whole being held in a strong iron frame having two standards. The hammer block weighs many tons, and must rest upon very strong and solid foundations, common to the whole. The lift or stroke of the hammer is from 5 to 9 ft., depending upon the size of the machine. The momentum will of course vary with the steam

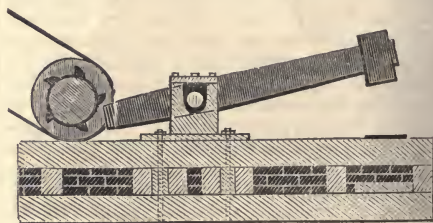


FIG. 1.—Tilt Hammer.

pressure and length of stroke, which, from the construction of the cylinder, may be varied to suit circumstances. A monster steam hammer of a construction similar to Nasmyth's is employed in Krupp's cast-steel works at Essen, Germany. The hammer head is 12 ft. long, 5½ ft. wide, 4 ft. thick, and weighs a little over 50 tons, and has a stroke of 9 ft. The depth of the foundation is 100 ft., consisting of three parts, masonry, timber, and iron, bolted together. Four cranes, each capable of bearing 200 tons, serve the hammer with material. Smaller steam hammers of much higher speed are used in forging smaller articles, such as swords, scythes, axes, carpenters' tools, steel bars, &c. One of these, exhibited at the Vienna exposition in 1873 by Gustav Brinkmann and co. of Westphalia, is represented in fig. 2. While the frames of the large hammers have two standards, this has only one, an advantage allowed by its smaller size. The admission of the steam is effected by a simple slide valve worked by a hand lever, as shown in the engraving. In this machine, in consequence of the manner in which the steam is admitted, the length of stroke is constant; in this individual case, 7½ in. The weight of the hammer is 4 cwt., and

the average number of blows when worked with steam at a pressure of 45 lbs. per square inch is 360 per minute. The piston rod, $6\frac{1}{2}$ in. in diameter, is cast steel, forming with the piston one piece. The hammer head is fastened to it by means of keys. The greatest height



FIG. 2.—High-Speed Steam Hammer.

of pieces which can be forged under the hammer is $4\frac{1}{2}$ in. The bottom of the frame is 3 ft. square, and its total height to the flanges of the cylinder is $5\frac{1}{2}$ ft. The total weight of the machine is $4\frac{1}{2}$ tons.

HAMMER, Julius, a German author, born in Dresden, June 7, 1810, died at Pilitz, Aug. 23, 1862. In 1831 he began the study of law at the university of Leipzig, but gave special attention to philosophy and æsthetics. In 1834, in conjunction with Ludwig Tieck and Theodor Hell, he produced the successful play *Das seltsame Frühstück*, and thereafter devoted himself to literature. He wrote dramas, novels, and poems, and gave dramatic readings. Among his novels are *Adelig und Bürgerlich* (1838), *Leben und Traum* (1839), *Stadt- und Landgeschichten* (1845), and *Einkehr und Umkehr* (1856). His principal poems are *Schau um dich und Schau in dich* (1851), *Zu allen guten Stunden* (1854), and *Lerne, liebe, lebe* (1862). In his later years he devoted himself to oriental study, and published *Unter dem Halbmond* (1860), and *Die Psalmen der heiligen Schrift* (1861).

HAMMERFEST, a seaport of Norway, in the bailiwick of Finnmark, on the island of Kvalø, in lat. $70^{\circ} 40'$ N., lon. $23^{\circ} 42'$ E., 57 m. S. W. of the North cape; pop. about 1,000. It is celebrated as the most northern town in the world, and for its lively trade with Russia, England, and other countries. The cod fishery in the Hammerfest district in 1871 yielded about 5,000,000 fish, or nearly one half of the cod caught in Finnmark. Over 200 fishing boats and 100 large vessels frequent the bay annually. Cod-liver oil is largely prepared, and various skins, walrus teeth, and other articles are exported. A number of small sloops are engaged in the trade with Spitzbergen, where reindeer, walrus, and white bears are killed. Although the port is in so high a latitude, navigation is seldom interrupted. The harbor is defended by a fort. A granite pillar in the rear of the English vice-consulate marks the commencement of the great European arc measured by Russia, Sweden, and Norway, 1816-'52.

HAMMER-PURGSTALL, Joseph von, a German orientalist, born in Gratz, Styria, June 9, 1774, died in Vienna, Nov. 24, 1856. He studied the Arabic, Persian, and Turkish languages at the oriental academy of Vienna, and, after passing three years in Dalmatia and in travel, went in 1799 to Constantinople as interpreter to the internuncio. In the following year he was commissioned to prepare a report upon the condition of Syria and Egypt, and to inspect the consulates in the Levant. In 1801 he engaged in the Egyptian campaign as secretary-interpreter of the Anglo-Turkish generals, taking part in the conference at Jaffa, and in the surrender of Alexandria. He subsequently visited England. In 1802 he was again sent to Constantinople as secretary of legation, and in 1806 was appointed diplomatic agent at Jassy in Moldavia. He returned to Vienna in 1807, which he never again left except for short journeys. In 1815 he was sent to Paris to receive back the oriental manuscripts which had been carried thither after the occupation of Vienna in 1809, and on his return was offered the place of custodian of this collection, which he declined. In 1816 he was appointed interpreter to the court, and in 1817 aulic councillor. Inheriting the estate of the counts of Purgstall in 1837, he added that name to his own, and was created a baron. In 1847 he was elected president of the academy of Vienna, but resigned this office in 1849. His large fortune enabled him to devote himself to study. He spoke and wrote ten languages, and though his philological learning was extensive rather than profound, his works are among the most valuable authorities upon oriental history and literature. His care in the references to his authorities renders it easy to correct the errors into which he has fallen. His writings in several languages, including his contributions to the journals of various literary and scientific bodies, would make more than 100 octavo volumes. Among his chief works are: *Geschichte der*

schönen Redekünste Persiens (Tübingen, 1818); *Geschichte des osmanischen Reichs* (10 vols., Pesth, 1827-'34); *Geschichte der osmanischen Dichtkunst* (4 vols., 1836-'8); *Geschichte der Goldenen Horde im Kiptschak* (1840); and *Literaturgeschichte der Araber* (7 vols. 4to, Vienna, 1850-'57). A posthumous autobiography, *Denkwürdigkeiten aus meinem Leben*, and others of his posthumous writings, were published in 1858.

HAMMERSMITH, a village of Middlesex, England, on the Thames, $3\frac{1}{2}$ m. W. of London; pop. in 1871, 24,520. It has a handsome suspension bridge, many elegant houses and villas, a grammar school endowed by Bishop Latimer, with an annual revenue of £800, several churches and charitable institutions, and a Catholic school and nunnery established in the reign of Charles II. The vicinity is chiefly occupied by nurseries and market gardens, which supply the metropolis with flowers and vegetables.

HAMMOND, **James Hamilton**, an American statesman, born at Newberry, S. C., Nov. 15, 1807, died at Beach Island, S. C., Nov. 13, 1864. His father, Elisha Hammond, a native of Massachusetts, became in 1802 professor of languages in South Carolina college, and afterward president of that institution. The son graduated there in 1825, was admitted to the bar, and in 1830 became editor of the "Southern Times" at Columbia. He married a lady of large fortune, and devoted himself to agriculture and politics. He wrote much, made many public addresses in behalf of nullification, and took an active part in organizing the military force which South Carolina raised in 1833 to resist the federal government. In 1835-'7 he was a member of congress, and in 1842 governor of South Carolina. In 1844 he published a letter to the Free church of Glasgow, Scotland, on slavery in the United States, and in 1845 two others in reply to an anti-slavery circular by Thomas Clarkson; these with other essays on the same subject were collected in a volume, "The Pro-Slavery Argument" (Charleston, 1853). Besides essays on agriculture, manufactures, railroads, and finance, he published an elaborate review of the life, character, and public services of John C. Calhoun. In November, 1857, he was elected to the senate of the United States to fill the vacancy occasioned by the death of A. P. Butler. In March, 1858, he made a speech in the senate in which he called the laboring classes "mudsills," a phrase which provoked much comment. In the same speech he said, "Cotton is king, and no power upon earth dares make war upon it." On the secession of South Carolina in December, 1860, he withdrew from the senate, but during the civil war ill health compelled him to remain quietly at home.

HAMMOND, **Samuel**, an officer in the American revolution, born in Richmond co., Va., Sept. 21, 1757, died at Horse Creek, Ga., Sept. 11, 1842. In his boyhood he served in wars against the Indians. In 1775 he raised a com-

pany, and took part in the battle of Longbridge; and in 1779 he was at the battle of Stono Ferry, S. C. After the fall of Charleston he kept the field with a small cavalry force, pursuing an active partisan warfare. He distinguished himself in the actions at Cedar Springs, Musgrove's Mill, Ramsay's Mills, King's Mountain, Blackstocks, Cowpens, Guilford Court House, and Eutaw, and participated in the siege of Augusta in 1781. He settled in Georgia, and in 1793 led a volunteer regiment against the Creek Indians; in 1802 was elected to congress; in 1805 was appointed by Jefferson to the civil and military command of upper Louisiana; and in 1824 removed to South Carolina, where he became surveyor general of the state in 1827, and secretary of state in 1831.

HAMMOND, **William Alexander**, an American physician, born at Annapolis, Md., Aug. 28, 1828. He graduated in the medical department of the New York university in 1848, and from 1849 to 1850 was an assistant surgeon in the army. In October, 1860, he was appointed professor of anatomy and physiology in the university of Maryland. He was reappointed assistant surgeon in the army, May 28, 1861, and was surgeon general from April, 1862, to August, 1864, when he was dismissed by sentence of a court martial. He then removed to New York, and is now (1874) professor of diseases of the mind and nervous system, and of clinical medicine, in the Bellevue hospital medical college, and physician-in-chief to the New York state hospital for diseases of the nervous system. He has published "A Treatise on Hygiene, with special reference to the Military Science" (8vo, Philadelphia, 1863); "Physiological Memoirs" (1863); "Lectures on Venereal Diseases" (1864); "On Wakefulness, with an Introductory Chapter on Sleep" (1865); "Insanity in its Medico-Legal Relations" (New York, 1866); "Sleep and its Derangements" (12mo, Philadelphia, 1869); "Physics and Physiology of Spiritualism" (12mo, New York, 1870); "Treatise on Diseases of the Nervous System" (1871); and "Insanity in its Relations to Crime" (1873). He has also edited "Medical and Surgical Essays" (1864); and translated from the German Meyer's "Electricity in its Relations to Practical Medicine" (1869; new ed., 1874).

HAMON, **Jean Louis**, a French painter, born at Plouha, May 5, 1821, died May 29, 1874. He escaped from a monastery in 1840 to study painting under Paul Delaroche. In 1848 he exhibited two paintings, "Over the Gate" and the "Tomb of Christ," at the museum of Marseilles. After 1849 he worked at the painting of Sèvres china, producing some specimens which gained him a medal at the world's fair in London in 1851. In 1852 he returned to oil painting, and exhibited his "Comedy of Humanity" and *Ma sœur n'y est pas*; the latter was purchased by the government. He has since produced a number of pictures, several of them representing scenes in the East. Among

the best known are "The Maidens of Lesbos" (1861) and "The Muses at Pompeii" (1866).

HAMPDEN, a S. W. county of Massachusetts, bordering on Connecticut, intersected by the Connecticut and drained by Westfield and Chicopee rivers; area, 670 sq. m.; pop. in 1870, 78,409. It has a rough, hilly surface, and a fertile soil, the river valleys being particularly rich. Small steamboats navigate the Connecticut to Springfield, and the county is traversed by the New Haven, Hartford, and Springfield, the Connecticut River, the New London Northern and the Ware branch, the Athol and Enfield, the New Haven and Northampton and the Holyoke branch, and the Boston and Albany railroads, and by a canal which is not now in use. The chief productions in 1870 were 2,045 bushels of wheat, 63,518 of rye, 145,728 of Indian corn, 74,617 of oats, 11,484 of buckwheat, 267,762 of potatoes, 1,095,423 lbs. of tobacco, 35,103 of maple sugar, 18,737 of wool, 716,979 of butter, 242,046 of cheese, and 51,859 tons of hay. There were 3,585 horses, 10,200 milch cows, 2,718 working oxen, 9,023 other cattle, 6,751 sheep, and 4,210 swine. The county contained 687 manufacturing establishments, chiefly in Springfield, the county seat, and in Chicopee and Holyoke, having an aggregate capital of \$16,942,490, and an annual product of \$80,008,006.

HAMPDEN, John, an English statesman, born in London in 1594, died at Thame, Oxfordshire, June 24, 1643. He was the son of William Hampden, a member of Queen Elizabeth's parliament, and Elizabeth Cromwell, aunt of the protector. His father left him large estates, and after studying at Oxford he was admitted a student of the Inner Temple in 1613. In 1619 he married Elizabeth Symeon. For several years he freely engaged in field sports and other amusements, "from which," says Clarendon, "he suddenly retired to extraordinary sobriety and strictness, and to a more reserved and melancholy society." On Jan. 30, 1621, he took his seat in parliament as member for the borough of Grampound, Cornwall. In the first parliament of Charles I. he sat for Wendover. He had not hitherto taken any prominent part in public affairs; his attention had been given mainly to the details of parliamentary business and to the local interests of his own country. But when the king, after the angry dissolution of two parliaments (1625 and 1627), attempted to raise money by a forced loan, apportioned among the people according to a previous rate of assessment, Hampden refused to lend a farthing, and was imprisoned. His example was followed by 76 other landed gentlemen, who were also arrested, while recusants of a lower rank were pressed into the fleet or forced to serve in the army. A new parliament was summoned; and Hampden, having been liberated, was immediately reelected for Wendover. The "Petition of Rights" and other important concessions having been extorted from the king, and parliament having

been again dissolved for protesting against his violation of them, Hampden retired to rural life, and devoted himself to literary pursuits. Eleven years passed without a parliament; the royal promises were unscrupulously violated, and the Puritans were persecuted. Among other arbitrary measures, Charles resorted to "ship money," a tax which the maritime counties had sometimes paid in time of war instead of furnishing ships for the navy, but which was now, in time of peace, demanded from the inland counties. Hampden, the first to resist the forced loan, was also one of the first to resist this unjustifiable proceeding, and resolved to bring to a solemn hearing the great controversy between the people and their oppressor. Toward the close of the year 1636 the cause came on in the exchequer chamber before the twelve judges, seven of whom pronounced against the disputant. The only effect of the decision of this small majority was to exasperate the people. Strafford meanwhile declared that Hampden, and others like him, should be "well whipped into their right senses;" and so intense became the hatred of the king's counsellors, that the person of Hampden was scarcely safe. This decision of the exchequer chamber placed the property of every individual at the disposal of the crown. The persecuted party felt that there was no alternative but to seek their homes in other countries; but an order was issued by Charles's council, prohibiting shipmasters from carrying passengers from the kingdom without special license. It has been said that Hampden and his cousin Oliver Cromwell had taken passage in a ship ready to sail for America, and were actually on board when they were stopped by this decree; seven other ships crowded with emigrants were stopped at the same time. The Scottish rebellion followed, and the expenses of the war rendered it imperative for the king to obtain larger supplies. A parliament was summoned to meet in April, 1640; it was soon dissolved, and another, the long parliament, met in November. Hampden was at this time the most popular man in England, and by universal consent was the member who exercised a paramount influence alike over legislature and people. He was one of the committee of twelve to conduct the memorable trial which led to Strafford's execution. He was one of the five members accused of treason, whose persons were demanded by Charles; but he was not arrested, in spite of the most strenuous efforts of the king. Almost the entire people were ready to protect and conceal Hampden and his confederates. "From this moment," says Clarendon, "his nature and carriage seemed fiercer than before." He was made a member of the committee of public safety, and the power of the sword being at length asserted, he prepared to take the field as a soldier. The king raised his standard against the parliamentary troops at Notting-ham, Aug. 22, 1642. Hampden commanded a

regiment of volunteer infantry, which he had raised in his native county, and was so distinguished by his intrepid conduct in the succeeding movements, that a wish was expressed that he should take command of the whole army. On the evening of June 17, 1643, Prince Rupert set out for Oxford with 2,000 men, on one of his expeditions. Hampden hastened with a body of volunteers to intercept his return, and overtook the enemy at Chalgrove. A skirmish ensued, and in the first charge Hampden was struck in the shoulder by two balls, which lodged in his body. After six days of acute suffering he expired, uttering with his latest breath a prayer for England.

HAMPDEN, Renn Dickson, an English bishop and scholar, born in the island of Barbadoes in 1793, died in London, April 23, 1868. He studied at Oriel college, Oxford, graduated in 1813, and became fellow in 1814, tutor in 1828, and public examiner in classics in 1830. He preached the Bampton lectures in 1832, his subject being "The Scholastic Philosophy considered in its relation to Christianity." These lectures were regarded as very learned and profound, but of rather suspicious orthodoxy. In 1833 Dr. Hampden was appointed principal of St. Mary's hall, and the next year professor of moral philosophy in the university. Against much opposition, based on the work above named, and his published views as to dissent in England, he was in 1836 appointed regius professor of divinity; and in 1847, notwithstanding increased opposition, on the part mainly of the high Anglican or tractarian party, he was made bishop of Hereford. Besides the Bampton lectures, and the articles on Aristotle, Plato, and Socrates in the "Encyclopædia Britannica" (collected, "The Fathers of Greek Philosophy," Edinburgh, 1862), his principal works are: "Philosophical Evidence of Christianity" (1827); "Lectures on Moral Philosophy" (1836); "Lecture on Tradition" (1841); "Sermons before the University" (1836 and 1847); and "Life and Writings of Thomas Aquinas" in the "Encyclopædia Metropolitana."

HAMPDEN SIDNEY COLLEGE, an institution of learning in Prince Edward co., Va., about 70 m. W. S. W. of Richmond, under the charge of the Presbyterians. It was founded in 1775 and chartered in 1783, and in 1873-'4 had 5 professors, 86 students, and libraries containing about 7,000 volumes. The Presbyterian union theological seminary was established near this college in 1823 and chartered in 1866, and in 1873-'4 had 4 professors, 61 students, a library of 7,500 volumes, and an endowment of more than \$100,000.

HAMPSHIRE. I. A W. central county of Massachusetts, intersected by the Connecticut river, and drained by several mill streams, among which are the head waters of Chicopee and Westfield rivers; area, 524 sq. m.; pop. in 1870, 44,388. Its surface is irregular, and in some parts mountainous; the soil, especially near the Connecticut, is very fertile. It is

traversed by the New London Northern and its Ware branch, the Athol and Enfield, the New Haven and Northampton, and the Connecticut River railroads. The Boston and Albany railroad touches the S. W. portion. The chief productions in 1870 were 4,847 bushels of wheat, 36,706 of rye, 157,939 of Indian corn, 64,572 of oats, 274,608 of potatoes, 3,720,587 lbs. of tobacco, 43,832 of wool, 1,003,427 of butter, 136,086 of cheese, and 61,734 tons of hay. There were 4,478 horses, 9,514 milch cows, 2,034 working oxen, 10,771 other cattle, 10,173 sheep, and 5,062 swine. The county contained 433 manufacturing establishments, having an aggregate capital of \$7,053,085, and an annual product of \$13,445,772. One of the three large reservoirs on the upper part of Mill river in this county burst on May 16, 1874, and the waters destroyed the principal factories at Williamsburg, Leeds, Haydenville, and Skinnerville, causing the death of over 150 persons, and a loss of property estimated at nearly \$2,000,000. Capital, Northampton. II. A N. E. county of West Virginia, bordering on Maryland, from which it is separated by the Potomac, and on Virginia, drained by Great and Little Cacapon rivers, and by the S. branch of the Potomac; area, 750 sq. m.; pop. in 1870, 7,643, of whom 640 were colored. It is traversed by ranges of the Alleghany chain, has numerous fertile valleys, and abounds in coal and iron. The Baltimore and Ohio railroad passes along the N. boundary. The chief productions in 1870 were 76,832 bushels of wheat, 21,885 of rye, 120,325 of Indian corn, 46,769 of oats, 13,800 of potatoes, 26,658 lbs. of wool, 114,948 of butter, and 4,587 tons of hay. There were 2,380 horses, 6,557 cattle, 8,317 sheep, and 4,763 swine. Capital, Romney.

HAMPSHIRE, Hants, or Southampton, a maritime county of England, including the isle of Wight, bordering on Berkshire, Surrey, Sussex, the English channel, Dorsetshire, and Wiltshire; area, 1,667 sq. m.; pop. in 1871, 543,387. It is one of the most agreeable counties in England, the surface being a beautiful alternation of hill and dale, and the climate remarkably mild and healthful. The soil is of various quality. The N. districts are hilly and poor; the S. W. portion is chiefly occupied by the New forest and extensive heaths; but in the central sections the land is fertile and produces heavy crops of hay and corn. The principal vegetable productions are wheat, barley, oats, beans, turnips, and peas. Sheep are raised on the light lands; and the breeding and fattening of pigs is an important part of the husbandry, Hampshire being celebrated for its bacon. Ringwood is noted for its strong beer, and the paper mills of Romsey and Overton have supplied the bank of England with note paper since the reign of George I. The principal rivers are the Itchen, Avon, and Anton. There are two canals, the Basingstoke and the Andover. The most important towns

are Portsmouth, Southampton, and Winchester. Aldershot, on the borders of Surrey, has become a place of some note from the formation of a military station there.

HAMPSTEAD, a suburb of London, in Middlesex, situated on a range of hills, 4 m. N. W. of the city; pop. in 1871, 32,281. It has a pleasant and healthy situation. In former times Hampstead was renowned for its mineral springs, and at present it is one of the most popular resorts of Londoners. Hampstead heath, on the summit of the principal hill, is crowded with people on fine days, and particularly on Sunday, when excursions on donkeys are made and picnic parties assemble there. The village proper is irregularly built, but in its vicinity are fine villas, and there are many schools. Hampstead has always been a favorite resort of poets, including Pope and Byron. The upper Flask inn on Hampstead heath, once the place of meeting of the Kit-cat club, of which Addison and Steele were members, is now a private residence. At the present day there are many famous taverns, especially Jack Straw's, which was much frequented by Dickens and his friends.

HAMPTON, a town and the county seat of Elizabeth City co., Virginia, on the W. bank of Hampton river, a small inlet of Hampton roads, about 2½ m. from Fortress Monroe, and 75 m. S. E. of Richmond; pop. in 1870, 2,300, of whom 1,840 were colored. Before the civil war it was a fashionable watering place. It was burned by the confederates under Gen. Magruder in August, 1861, but is now steadily recovering. It is the seat of the Hampton normal and agricultural institute, designed especially to train colored youth as teachers of their own race, by giving an English and an industrial education, while affording students an opportunity to defray a portion of their expenses by labor. The grounds, comprising a farm of 125 acres bordering on the river ½ m. below the village, were purchased by the American missionary association in 1867, at the instance of Gen. S. C. Armstrong, then superintendent of a department of the freedmen's bureau at Hampton, and since principal of the institute. It was incorporated in 1870, and in 1872 the state awarded to it one third (\$95,000) of the proceeds of the congressional land grant for the support of an agricultural and mechanical college, with a portion of which 72 acres more of land have been purchased. The hall containing the school

rooms, printing office, and boys' dormitories, erected in 1870, chiefly by the aid of the freedmen's bureau, is in the form of a Greek cross, three stories high and 110 ft. long by 85 ft. wide, and was constructed, partly by the labor of the students, of brick made on the farm. The corner stone of another hall, for the girls' dormitories, chapel, &c., to be 190 ft. in front and 40 ft. wide, with a wing running 100 ft. to the rear, was laid in 1873. About 150 acres of the farm are under cultivation by the boys. Tuition and room rent are free. The printing office was opened in November, 1871, and has been successfully operated by the students. The first number of the "Southern Workman," a monthly illustrated periodical devoted to the industrial interests of the freedmen, was issued on Jan. 1, 1872. The girls find employment in the laundry and kitchen, and in various kinds of needlework. The number of instructors in 1873-4 was 18; of students, 226, of whom 149 were males and 77 females. The course is three years. The Butler school house, belonging to the institute, in which was organized one of the earliest of the freedmen's schools, is used by the county as a free school, and contains about 200 pupils. Adjacent to the grounds is the national cemetery, containing a chapel, a handsome granite monument, and the graves of 5,123 Union soldiers; and near by is the national home for disabled soldiers, once a flourishing female seminary, which in 1872 provided for 538 veterans at an expense of \$62,923 17.

HAMPTON, a parish of Middlesex, England, 12 m. W. S. W. of London, on the N. bank of the Thames, near its junction with the Mole; pop. in 1871, 6,122. In the vicinity is the palace of Hampton Court, once a favorite resi-



Hampton Court.

dence of the Tudors and the Stuarts, and now with its gardens a very popular holiday resort of the Londoners. The gardens in their pres-

ent form were laid out by William III., and comprise 44 acres. They are in the formal Dutch style, with elevated terraces, long shady arcades, and a curious maze or labyrinth. The palace consists of three quadrangles, two of which were erected by Cardinal Wolsey, who presented them when finished to Henry VIII. The great eastern and southern fronts were erected by Sir Christopher Wren. This palace contains a fine collection of pictures, including the famous cartoons of Raphael, open to the public free of charge, and is occupied in part by persons of rank in reduced circumstances. Edward VI. was born here, and here his mother Queen Jane Seymour died. Charles I. was for some time imprisoned here.

HAMPTON. I. Wade, an American soldier, born in South Carolina in 1755, died at Columbia, S. C., Feb. 4, 1835. During the revolutionary war he served under Sumter and Marion, and he was elected to congress in 1794, and again in 1802. In 1808 he was appointed a colonel in the United States army, and placed in command of one of the new regiments raised in apprehension of a war with Great Britain. In 1809 he was made brigadier general, and subsequently was placed in command at New Orleans, but in 1812 was superseded by Wilkinson. In 1813 he was raised to the rank of major general, and was soon after placed in command of the army on Lake Champlain. He did not succeed, and resigned his commission in 1814, and returned to South Carolina. He acquired a large fortune by speculations in land, and at his death was supposed to be the most wealthy planter in the United States, being, as it was said, the owner of more than 3,000 slaves. **II. Wade**, a confederate soldier, grandson of the preceding, born at Columbia, S. C., in 1818. He graduated at the university of South Carolina, studied law, and was successively a member of the house and of the senate in the state legislature. At the commencement of the civil war he entered the confederate service, and commanded the Hampton legion of cavalry at the battle of Bull Run, where he was wounded. He was made brigadier general, served in the Chickahominy campaign, and was again wounded in the battle of Seven Pines. He afterward commanded a cavalry force in the army of northern Virginia, and was again wounded at Gettysburg. In 1864 he was made lieutenant general, and commanded a body of cavalry in Virginia. He was afterward sent to South Carolina, and in February, 1865, commanded the rear guard of the confederate army at Columbia. Large quantities of cotton had been stored here, and upon the approach of the Union army under Gen. Sherman, this was piled in an open square ready to be burned. Fire was set to it, which resulted in a conflagration by which a great part of the city was destroyed. A sharp discussion subsequently arose between Hampton and Sherman, each charging the other with the wilful destruction of Columbia. The fact

appears to be that, as far as either was concerned, the conflagration was purely accidental. (See COLUMBIA, and CONFLAGRATION.)

HAMPTON ROADS, an arm of Chesapeake bay, lying between Hampton and Norfolk, Va., forming the estuary of James river. It has a depth of from five to seven fathoms. The channel is commanded by Fortress Monroe, situated on a point of land on the N. shore near the entrance.—A naval action took place here, March 8, 1862, between the confederate ironclad Virginia and the Union frigates Cumberland, Congress, and Minnesota; and another on the 9th between the Virginia and the turret ship Monitor. In April, 1861, the steam frigate Merrimack, lying at Norfolk, was seized by the confederates, set on fire, and then scuttled and sunk. She was subsequently raised, her hull plated with railroad-iron bars, and named the Virginia. Early in March, 1862, there were lying in Hampton roads the United States frigates Cumberland and Congress, the ship St. Lawrence, and the steam frigates Minnesota and Roanoke, the last named being partially disabled by the breaking of her shaft. On the morning of the 8th the Virginia, attended by two small steamers, came down from Norfolk, passed the Congress, receiving a harmless broadside, which was effectively returned, and steered directly for the Cumberland, which she struck with her iron-plated bow, making a large hole, and then opened fire from her battery. The Cumberland sank in 45 minutes after being struck. The Congress endeavored to escape into shoal water, where the Virginia could not follow, but ran aground, while the Virginia took up a position close under her stern, and poured in a heavy fire, by which the frigate was soon disabled and set on fire. In eight hours the flames reached the magazine, and the vessel was blown up. The St. Lawrence and Roanoke had meanwhile got off and gone down the bay. The Minnesota lay fast aground, and was attacked by the three confederate vessels; but the draft of the Virginia would not permit her to come within a mile, and only one shot from her struck the Minnesota. As night came on, the confederate vessels withdrew. Besides the two frigates, the Union loss was 286; of whom the Cumberland lost 121 killed or drowned, the Congress 100 killed, 26 wounded, and 20 prisoners, and the Minnesota 3 killed and 16 wounded. On the Virginia there were 2 killed and 8 wounded; on the other confederate steamers, 4 killed and several wounded. Early the next morning the Virginia again approached the Minnesota, which was still fast aground. But in the mean while the Union ironclad Monitor, the first turreted vessel ever brought into action, had arrived from New York, and interposed between the Virginia and the Minnesota. The vessels opened fire, but without giving or receiving damage, the armor of each affording perfect protection. The Virginia now again assailed the Minnesota, and received a full broadside at almost point-blank range, which

did no harm. The Monitor kept steaming around the Virginia, searching for a vulnerable point; but her 168-lb. shot glanced off harmlessly. The Virginia then ran down the bay, as if in retreat, followed by the Monitor, but turned suddenly, and attempted to run down her antagonist, which was hardly one fifth her size. But a blow like that which had pierced the Cumberland made no impression upon the Monitor; and the prow of the Virginia having been slightly damaged, she gave up the battle and steamed toward Norfolk. In this action no one appears to have been injured on the Virginia. Lieut. (after Commodore) Worden, the commander of the Monitor, was badly hurt by particles of cement thrown into his eyes by the concussion of shots which struck the turret, and two sailors were partially stunned by the same concussion. The Monitor remained unharmed. This action is notable as the first in which iron-clad vessels took part.

HAMSTER, a rodent of the rat family, or *muridae*, and the genus *cricetus* (Cuv.). The incisors are $\frac{3}{4}$, and the cheek teeth $\frac{3}{4}$ - $\frac{3}{4}$, or 16 in all, as in the rats; there are internal cheek

it passes in a state of lethargy; though its food is principally vegetable, it will devour flesh. It is ferocious and untamable, fighting with its mates, and biting the hand that feeds it. The burrows are often very complicated, and so capacious and well filled that it is an object with the farmer to collect their contents. Gestation lasts about four weeks, and occurs three or four times a year, each litter varying from six to twelve. It is very cleanly in its habits, and is an excellent climber, but a poor walker and runner. Other species are found in Siberia.—The Canada hamster, and others so called, with external cheek pouches, have been described under GORNER; the genus *cricetus* is not found in America. An American mouse of the genus *hesperomys* (*H. myoides*, Gapper), resembling the white-footed species, is sometimes called hamster mouse from its having internal cheek pouches; in no other character does it approach *cricetus*; it is found in Canada, Vermont, and New York.

HANAU, a town of Prussia, in the province of Hesse-Nassau, at the junction of the Main and the Kinzig, 10 m. E. of Frankfurt; pop. in 1871, 20,278. It contains an ancient castle, now the seat of the Wetteravian society of natural history, one Catholic and three Protestant churches, an academy of design, and several schools. There are manufactories of silks, cottons, carpets, leather, iron ware, pottery, and jewelry, and a large trade in woods, drugs, and dyes. In the vicinity are the mineral baths of Wilhelmsbad. Here, on Oct. 30, 1813, Napoleon, on his retreat from Leipsic, defeated the Germans under Marshal Wrede. During the middle ages it was the capital of the sovereign counts of Hanau. In 1451 the county was divided into two states, Hanau-Münzenberg and Hanau-Lichtenberg, the rulers of both of which were made princes in 1696. In 1736 the house of Hanau became extinct, when Hanau-Münzenberg was united with the electorate of Hesse-Cassel, and Hanau-Lichtenberg with Hesse-Darmstadt; but in 1785 this division too was incorporated in the electorate. As a part of the latter Hanau was annexed to Prussia in 1866.

HANCOCK, the name of ten counties in the United States. **I.** A S. E. county of Maine, bordering on the Atlantic, and bounded W. in part by Penobscot river and bay; area, 2,000 sq. m.; pop. in 1870, 36,495. It is watered by Union river and several mill streams. The surface is uneven, and diversified with hills and lakes; the seacoast, including a number of islands, among which is the island of Mt. Desert, is broken by many good harbors; the soil is fertile. Many of the inhabitants are engaged in cod and mackerel fishing. The chief productions in 1870 were 2,999 bushels of wheat, 5,971 of Indian corn, 34,396 of oats, 32,798 of barley, 221,379 of potatoes, 72,827 lbs. of wool, 531,997 of butter, and 32,653 tons of hay. There were 1,958 horses, 5,777 milch cows, 2,399 working oxen, 5,103 other



Hamster (*Cricetus vulgaris*).

pouches, in which they carry grain and seeds to their subterranean abodes; the head is thick, the ears oval and round, the body rat-like, the legs short, and the tail about $1\frac{1}{2}$ in. long, covered with hair. There are several species in Europe and northern Asia, of which the best known is the common hamster (*C. vulgaris*, Cuv.); it is a little larger than a rat, reddish gray above, black underneath, with three yellowish white spots on each side, a white spot on the throat, and another under the chest; legs whitish. It is sometimes almost entirely black. The grooves and tubercles of the molars are more regular than in the rat; the fore feet are four-toed with the rudiment of a thumb, and the hind feet five-toed, free, and furnished with long claws adapted to digging; the eyes are small but prominent; the fur fine and long. The hamster commits great havoc among the grain, by the large quantities which it carries to its burrows; these are dug 3 or 4 ft. deep in light sandy soil, having two or more entrances and apartments, and each animal occupies its own; it thus lays up a store for winter, a part of which

cattle, 20,084 sheep, and 1,444 swine; 2 manufactories of wooden boxes, 10 of bricks, 3 of carriages, 15 of barrels and casks, 6 of marble and stone work, 6 of fish oil, 6 of saddlery and harness, 6 of sails, 9 tanneries, 1 planing mill, 35 saw mills, 4 establishments for curing and packing fish, 9 for building and repairing ships, and 6 for wool carding and cloth dressing. Capital, Ellsworth. **II.** The N. county of West Virginia, forming the extremity of the "Panhandle," bordering on Pennsylvania, and separated from Ohio on the N. and W. by the Ohio river; area, about 100 sq. m.; pop. in 1870, 4,363, of whom 27 were colored. It has a hilly surface and a fertile soil, and contains coal and fire clay. The chief productions in 1870 were 34,270 bushels of wheat, 83,180 of Indian corn, 68,494 of oats, 34,578 of potatoes, 128,642 lbs. of wool, 70,558 of butter, and 4,351 tons of hay. There were 835 horses, 869 milch cows, 1,001 other cattle, 26,353 sheep, and 1,892 swine; 2 manufactories of stone and earthen ware, 14 of brick, and 2 saw mills. Capital, Fairview. **III.** An E. central county of Georgia, bounded W. by the Oconee river, and E. by the N. fork of the Ogeechee; area, 440 sq. m.; pop. in 1870, 11,317, of whom 7,672 were colored. The surface and soil are diversified. It is well timbered, and contains granite, gold, agate, chalcidony, opal, kaolin, galena, zircon, and other minerals. The Macon and Augusta railroad passes through it. The chief productions in 1870 were 8,078 bushels of wheat, 141,630 of Indian corn, 17,794 of oats, 26,404 of sweet potatoes, 87,229 lbs. of butter, and 9,624 bales of cotton. There were 656 horses, 938 mules and asses, 1,430 milch cows, 3,174 other cattle, 1,634 sheep, and 5,893 swine; 1 cotton factory, and 2 saw mills. Capital, Sparta. **IV.** An extreme S. county of Mississippi, bounded S. by the gulf of Mexico, and W. by Pearl river, which separates it from Louisiana; area, about 1,000 sq. m.; pop. in 1870, 4,239, of whom 1,186 were colored. The surface is hilly in the N. and nearly level in the S.; the soil is moderately fertile. Pine forests abound. The New Orleans, Mobile, and Texas railroad passes through it. The chief productions in 1870 were 3,394 bushels of Indian corn; value of live stock, \$51,075. There were 8 saw mills. Capital, Shieldsborough. **V.** A N. E. county of Tennessee, bordering on Virginia, and drained by Clinch and Powells rivers; area, 480 sq. m.; pop. in 1870, 7,148, of whom 535 were colored. It is mountainous, well timbered, and thought to be rich in iron ore. The chief productions in 1870 were 22,956 bushels of wheat, 204,190 of Indian corn, 41,308 of oats, 10,453 of potatoes, 13,967 lbs. of wool, and 55,029 of butter. There were 1,263 horses, 1,514 milch cows, 2,540 other cattle, 7,365 sheep, and 10,690 swine. Capital, Sneedsville. **VI.** A N. W. county of Kentucky, separated from Indiana by the Ohio river; area, about 500 sq. m.; pop. in 1870, 6,591, of whom 729 were colored.

It has a hilly and undulating surface, the uplands being generally fertile, and the river bottoms extremely rich. The chief productions in 1870 were 12,354 bushels of wheat, 376,915 of Indian corn, 23,930 of oats, and 1,679,384 lbs. of tobacco. There were 1,961 horses, 1,249 milch cows, 1,622 other cattle, 5,099, sheep, and 9,449 swine; 3 flour mills, 1 manufactory of furniture, and 4 saw mills. Capital, Hawesville. **VII.** A N. W. county of Ohio, drained by branches of Auglaize and Portage rivers; area, 536 sq. m.; pop. in 1870, 23,847. It has a level surface and a rich soil, and abounds in limestone. It is traversed by the Lake Erie and Louisville, and the Findlay branch of the Cincinnati, Sandusky, and Cleveland railroads. The chief productions in 1870 were 514,183 bushels of wheat, 701,222 of Indian corn, 286,822 of oats, 80,763 of potatoes, 19,832 of flaxseed, 240,468 lbs. of wool, 91,849 of maple sugar, 765,744 of butter, and 32,903 tons of hay. There were 9,313 horses, 8,078 milch cows, 11,672 other cattle, 56,622 sheep, and 28,299 swine; 10 manufactories of carriages, 2 of clothing, 8 of furniture, 1 of engines and boilers, 1 of linseed oil, 8 of saddlery and harness, 4 of tin, copper, and sheet-iron ware, 1 of woollen goods, 2 of boots and shoes, 2 of iron castings, 12 flour mills, 1 planing mill, 20 saw mills, and 4 tanning and currying establishments. Capital, Findlay. **VIII.** A central county of Indiana, drained by Blue river and smaller streams; area, 312 sq. m.; pop. in 1870, 15,123. The surface is nearly level, and the soil is fertile. Timber is abundant. The Pittsburgh, Cincinnati, and St. Louis, the Cincinnati, Hamilton, and Indianapolis, and the Cleveland, Columbus, Cincinnati, and Indianapolis railroads traverse it. The chief productions in 1870 were 440,212 bushels of wheat, 810,496 of Indian corn, 42,050 of oats, 47,149 of potatoes, 141,244 lbs. of wool, 234,379 of butter, and 6,308 tons of hay. There were 5,246 horses, 3,986 milch cows, 5,364 other cattle, 13,449 sheep, and 22,042 swine; 15 manufactories of carriages, 6 of saddlery and harness, 5 of bricks, 3 flour mills, and 12 saw mills. Capital, Greenfield. **IX.** A W. county of Illinois, bordering on Missouri and Iowa, from which it is separated by the Mississippi river; area, 720 sq. m.; pop. in 1870, 35,807. It has an undulating surface, with alternate tracts of timber land and prairie, and a rich, well tilled soil. It is traversed by the Chicago, Burlington, and Quincy, and the Carthage branch, and by the Toledo, Peoria, and Warsaw, and the Toledo, Wabash, and Western railroads. The chief productions in 1870 were 414,028 bushels of wheat, 183,533 of rye, 1,510,401 of Indian corn, 579,599 of oats, 92,863 of Irish potatoes, 74,586 lbs. of wool, 443,770 of butter, and 36,062 tons of hay. There were 14,115 horses, 2,253 mules and asses, 9,437 milch cows, 17,009 other cattle, 20,582 sheep, and 44,561 swine; 9 manufactories of agricultural implements, 38 of carriages, 9 of barrels and casks,

6 of furniture, 12 of saddlery and harness, 13 of tin, copper, and sheet-iron ware, 1 of chewing tobacco, 2 of woollen goods, 1 distillery, 1 brewery, 14 flour mills, and 2 planing mills. Capital, Carthage. X. A N. county of Iowa, drained by the sources of Boone river and other streams; area, about 500 sq. m.; pop. in 1870, 999. The surface is mostly undulating prairie, and the soil fertile. It contains several small lakes and extensive deposits of peat. It is traversed by the McGregor and Missouri River railroad. The chief productions in 1870 were 18,918 bushels of wheat, 19,541 of Indian corn, 30,231 of oats, and 2,087 tons of hay, There were 377 horses, 967 cattle, 411 sheep, and 416 swine. Capital, Upper Grove.

HANCOCK, John, an American statesman, born in Quincy, Mass., Jan. 12, 1737, died there, Oct. 8, 1793. He graduated at Harvard college in 1754, and shortly after entered the counting house of an uncle, on whose death in 1764 he received a large fortune, and soon became a prominent merchant. In 1766 he was chosen to the Massachusetts house of representatives from Boston. The seizure of his sloop, the *Liberty*, occasioned a riot in 1768, when the royal commissioners of customs narrowly escaped with their lives. After the affray known as the "Boston massacre," in 1770, he was a member of the committee to demand of the royal governor the removal of the troops from the city; and at the funeral of the slain he delivered an address so glowing and fearless in its reprobation of the conduct of the soldiery and their leaders, as greatly to offend the governor, who eventually endeavored to seize Hancock and Samuel Adams, both of whom in 1774 became members, and the former president, of the provincial congress at Concord. This was one of the objects of the expedition to Concord in April, 1775, which led to the first battle of the revolution, after which Gov. Gage offered pardon to all the rebels except these two, "whose offences," he adds, "are of too flagitious a nature to admit of any other consideration but that of condign punishment." In the same year Mr. Hancock was chosen president of the continental congress, and in 1776 signed the Declaration of Independence. Leaving congress in 1777, on account of ill health, he returned to Massachusetts, where he was a member of the convention for framing a constitution for the state, and under that constitution was in 1780 chosen first governor; to which office, with an interval of two years, he was annually reelected till his death. He was a man of strong common sense and decision of character, of polished manners, easy address, affable, liberal, and charitable. In his public speeches he displayed a high degree of eloquence. As a presiding officer he was dignified, impartial, quick of apprehension, and always commanded the respect of congress. He employed his large fortune for useful and benevolent purposes, and was a liberal donor to Harvard college.

HANCOCK, Winfield Scott, an American soldier, born in Montgomery co., Pa., Feb. 14, 1824. He graduated at West Point in 1844, served mainly on frontier duty till 1846, and afterward in the war with Mexico. He was brevetted as first lieutenant for gallant and meritorious conduct in the battles of Contreras and Churubusco. From 1848 to 1858 he was again on frontier duty in various parts, and from 1859 to 1861 was quartermaster of the southern district of California. At the breaking out of the civil war he was recalled to Washington, and was made brigadier general of volunteers, Sept. 23, 1861. During the peninsular campaign he was especially conspicuous at the battles of Williamsburg and Frazer's Farm. He took an active part in the subsequent campaign in Maryland, at the battles of South Mountain and Antietam. Having been made major general, he commanded a division at Fredericksburg and Chancellorsville. On July 1, 1863, the first day of the battle of Gettysburg, he was sent by Gen. Meade to decide whether a decisive battle should be given there, or whether the army should fall back. He reported that Gettysburg was the place to fight, and took immediate command until the arrival of Meade. In the decisive action of July 3 he commanded on the left centre, which was the main point assailed by the confederates, and was severely wounded. For his conduct at Gettysburg he received (May 30, 1866) the thanks of congress. Having been disabled by his wound, he was on sick leave until March, 1864, being meanwhile engaged in recruiting the second army corps, which was placed under his command. He took the active command of this corps at the opening of the campaign of 1864, and bore a prominent part in the battles of the Wilderness (May 5, 6), Spottsylvania Court House (May 9-20), and North Anna (May 23, 24), the second battle of Cold Harbor (June 3), and the operations around Petersburg until June 19, when, his wound breaking out, he was for a short time on sick leave. He afterward resumed command, and took part in several actions until Nov. 26, when he was called to Washington to organize the first corps of veterans. After the close of the war he was placed successively in command of the middle department (1865-'66), the department of Missouri (1866-'77), of Louisiana and Texas (1867-'8), of Dakota (1870-'72), and, on the death of Gen. Meade in November, 1872, of the department of the East. In the democratic national convention held at New York in July, 1868, he was a candidate for the presidential nomination, receiving on the 1st ballot 33½ votes out of 317, which number gradually increased to 144½ on the 18th; this being, with the exception of 145½ cast for Pendleton on the 12th ballot, the greatest number of votes given to any candidate for the nomination until the 22d ballot, when Horatio Seymour received the unanimous vote of the convention.

HAND, a S. E. county of Dakota, recently formed, and not contained in the census of 1870; area, about 1,000 sq. m. It is watered by affluents of the Missouri and of the Dakota or James river. The N. W. portion is occupied by the "Plateau du Coteau du Missouri."

HANDEL, or **Händel**, **Georg Friedrich**, a German composer, born in Halle, Feb. 23, 1685, died in London, April 13, 1759. His father was the chamberlain and surgeon of a Saxon prince and also of the elector of Brandenburg, and was 63 years old when the boy was born. His predilection for music was so strong that his father, who wished him to become a lawyer, thought it necessary to lay his interdiction upon the study of the art. In his necessity the boy was fain to practise organ music by night upon one of the small clavicords of that period. About 1693 the father was called to Weissenfels by the duke upon business, and the child, then eight or nine years old, was taken with him. A grandson of the elder Handel held at the time some post in the family of the duke, by whom the talents of young Handel were made known to the members of the musical chapel. Upon a Sunday he was taken into the organ loft, and at the close of the service was placed in the organist's seat to play the voluntary. The duke remained to hear him play, and afterward asked who the child was. "Little Händel from Halle, my grandfather's youngest son," was the reply. The duke's views of music and musicians, and his arguments in their favor, were such as to abate the father's prejudices, and on returning to Halle music was added to the other studies of the child. The teacher chosen was Friedrich Wilhelm Zachau, the first organist and instructor in Halle, a thorough master of the old Saxon school. While pursuing the usual school studies then required of boys intended for the gymnasium and the university, he was kept by Zachau upon contrapuntal and fugal exercises, to steady practice upon the organ and harpsichord, and gradually brought to a familiar practical knowledge of the then principal instruments of the orchestra, the string quartet, the flute, and the oboe. To develop his feeling for musical form, he copied specimens of the style of the principal masters of his time, particularly of the old organists. At least as early as 1696, when the boy was 11 years old, a friend of the father took him to Berlin and presented him to the elector, afterward Frederick I. of Prussia, who was so much struck by his talents as to offer to take charge of his education and send him to Italy; a favor, however, wisely declined by his father. During his stay in Berlin the young musician had opportunity of hearing other and far higher music than before, the brothers Bononcini and the composer Attilio being in Frederick's service, and music being in a highly flourishing condition, through the influence of the electress, herself a fine musician. He returned to Halle, to school, and to Zachau, and was afterward bound to

home by new and stronger ties; for on Feb. 11, 1697, his father died, and the mother could not part with her only son. No immediate change in the plans laid for the son by the deceased father was made. The boy pursued his studies with such zeal and success as to matriculate in the university of his native city, Feb. 10, 1702. He was already an extraordinary performer upon the harpsichord and organ, a good violinist, and familiar with the instruments then in use. Ten years of constant practice had brought him to that skill in composition by which his musical ideas were thrown upon paper with as much facility as he wrote his native German; but as yet he was not emancipated from the forms of the schools, and wrote a fugue with more ease and elegance than a melody. On March 13, 1703, Handel, having just completed his 17th year, was formally installed organist of the *Domkirche* at Halle, with a regular salary and a right of free house rent, amounting in the aggregate to \$50 per annum. At the end of the first year he resigned. A new prospect had opened before him. His mother had allowed her son with her blessing to abandon the law. In March, 1703, Handel made music his profession. There was nothing more for him to learn in Halle or Leipzig; but in Hanover the greatest of the Italians then in North Germany, Abbé Steffani, was chapelmaster; and in Hamburg Reinhard Keiser, the greatest German operatic composer of his day, was astonishing the public by his inexhaustible fund of pleasing popular melody. To these cities the youth bent his steps. Hawkins records Handel's own account of his reception in Hanover: "When I first arrived at Hanover I was a young man under 20. I was acquainted with the merits of Steffani, and he had heard of me. I understood somewhat of music, and could play pretty well on the organ. He received me with great kindness, and took an early opportunity to introduce me to the princess Sophia and the elector's son, giving them to understand that I was what he was pleased to call a virtuoso in music; he obliged me with instructions for my conduct and behavior during my residence at Hanover; and being called from the city to attend to matters of public concern, he left me in possession of that favor and patronage which himself had enjoyed for a series of years." In June, 1703, Handel, doubtless by advice of Steffani, was in Hamburg. During the short opera season, ending in August, he played second violin in the orchestra, and gave lessons in music. He soon had an opportunity of showing his powers. The harpsichordist being one evening absent, the youthful violinist was persuaded to take the seat, to the astonishment of all the orchestra. Handel's first work of importance in Hamburg was a sort of oratorio on the "Passion," which Chrysander dates during the spring of 1704; his second, the opera *Almira*, composed in the summer and autumn of the same year. On the evening of Dec. 5,

Mattheson's *Cleopatra* was performed, the author, a tenor singer, taking the part of Antony. As composer he had the right to direct, and had at previous performances, after the death of the hero, come into the orchestra and taken the direction. On this evening Handel, being at the instrument, refused to give up his seat. On leaving the theatre they drew their swords upon each other in the open market place. The contest ended by the springing of Mattheson's weapon upon a broad metal button of Handel's coat. On Christmas day Keiser and others mediated between them, friendship was restored, Handel dined with Mattheson, and in the evening they attended together the rehearsal of *Almira*, which was produced Jan. 8, 1705. It ran 20 nights, until replaced by another work from the same pen, *Nerone*, Handel's second work for the stage. It was given but two or three times, owing to the interruption of Lent. Another work, with a most wretched text, completes the list of those which he wrote for the Hamburg stage; but it was not given till 1708, when the author had been long in Italy, and then owing to its length was divided into two, *Florinda* and *Dafne*. During the latter part of his residence in Hamburg Handel's time was fully occupied by his pupils and his studies. In three years he had saved 200 ducats. One invitation to visit Italy without expense in the train of a prince he had declined. The winter of 1706-'7 he passed in Florence with a Tuscan nobleman who had known him and heard his *Almira* in Hamburg. A *Dixit Dominus* of his composition shows that he was in Rome in April, 1707. In the autumn he returned to Florence and composed *Rodrigo*, his first Italian opera, which was received with great applause. In April, 1708, he was again in Rome, as the date upon his oratorio *Risurrezione* proves, which was followed by a cantata, *Il trionfo del tempo e del disinganno*. No opera being allowed at that time in Rome, his works there are confined to oratorios and church music. His refusal to change his religion alone prevented him from attaining the highest honors possible for the musical artist in Rome. In the summer of 1708 he was in Naples, where he composed the original Italian *Acis, Galatea e Polifemo*, and other works of less importance. For the carnival in Venice in the spring of 1709 he composed the opera *Agrippina*, which was performed with extraordinary success. Being appointed chapelmaster by the elector of Hanover, afterward George I. of England, which office he accepted on condition of being allowed to visit London, he returned to Germany, spent a year there, and arrived in England near the close of 1710. He was not yet 25 years old, but was already famous as a performer on the organ and harpsichord, and as a composer of Italian operas. On Feb. 24, 1711, *Rinaldo* was given, which is said to have been composed in a fortnight, and was so much admired that the publisher cleared £1,500 by the sale of the songs and airs. The season closed June 2, and

Handel returned to Hanover for a time, during which he composed most of his chamber duets; probably also a large proportion of his instrumental music may be referred to this period. In the summer of 1712 he returned to England, where he produced, on Nov. 26, the short pastoral opera *Il pastor fido*; Jan. 10, 1713, *Teseo*; Feb. 6, "Ode on Queen Anne's Birthday;" and in the summer, the "Utrecht Te Deum," which he had completed in January preceding, and for which the queen settled upon him a pension of £200 per annum. This "Te Deum," which celebrated an event distasteful to the elector, together with Handel's prolonged stay in London, cost him for a time the favor of George. With the exception of *Silla*, a short opera, written for private performance at Burlington house, he composed no extensive score until the *Amadige* in 1715. Meantime Anne had died, and the elector had been crowned king of England, at whose court Handel dared not appear. By advice of Baron Killmansegge and Lord Burlington, he prepared a set of instrumental pieces, employing all the instruments then in use, which were performed, Aug. 22, 1715, on occasion of a grand boat procession on the Thames in which the king took part. This music is the well known "Water Music," and its striking beauties restored the composer to royal favor. Another £200 was added to his salary, which was again increased by a like amount a few years later, when he undertook the musical instruction of the young princesses. In 1716 Handel went with the court to Hanover, and the only important work of this year was the music to Brookes's German poem on the "Passion of Christ." On returning to London he accepted the place of music director to the duke of Chandos, for whose chapel during the next three years he composed the noble works, in three, four, and five parts, known as the "Chandos Anthems," and for whom were written his first English oratorio, "Esther," performed Aug. 29, 1720, and the English "Acis and Galatea." In February, 1719, he wrote to his brother-in-law, saying that he was detained in England by business upon which his future career depended. This business was an attempt to place Italian opera in London upon a firm foundation, under the name of the "Royal Academy of Music," by a subscription of £50,000 from the king and nobility. He went to the continent, engaged a company of singers, and the royal academy opened April 2, 1720. His *Radamisto*, first performed here April 27, achieved great success; but his Italian colleagues now conspired against him, the duchess of Marlborough and her influential wing of fashionable society siding with Bononcini. To settle the rival claims, it was decided that the latter and another Italian and Handel should each compose one act of a new three-act opera, which resulted in their joint production of *Muzio Scevola*, performed in April, 1721. Although the greatest merit was award-

ed to the third act, composed by Handel, he and his enterprise were nevertheless subjected to continued hostility. His subsequent operas composed for the royal academy are: *Flori-dante*, Dec. 9, 1721; *Ottone*, Jan. 12, 1723; *Flavio* and *Giulio Cesare*, 1723; *Tamerlano*, 1724; *Rodelinda*, 1725; *Scipione*, 1726; *Alessandro*, May 7, 1726; *Admeto*, 1727; *Siroe* (Cyrus), 1728; *Tolommeo*, 1728. Twelve operas and a transcendent third act of another, together with his labors as royal chapel-master and director of the opera, would seem to be enough for the productiveness of eight years; but in 1727 he had added to the list of his minor works the noble anthems for the coronation of George II. But with the production of *Tolommeo* in 1728, the £50,000 subscription was exhausted, and the royal academy was bankrupt. Handel had now saved £10,000, and determined to risk it in the attempt to carry on an enterprise in which the nobility had signally failed. He therefore formed a partnership for three years with Heidegger of the Haymarket theatre; visited Germany, thence went on to Italy, taking his old friend and monitor Abbé Steffani with him, and returned to London with an excellent company in June, 1729. The season opened Dec. 2. For this enterprise Handel's operatic works were: *Lotario*, Dec. 2, 1729; *Partenope*, Feb. 24, 1730; *Porco*, Feb. 2, 1731; *Ezio*, Jan. 25, 1732; *Sosarme*, Feb. 15, 1732; *Orlando*, Jan. 27, 1733; *Ariadne*, Jan. 26, 1734; *Parnasso in festa* (serenata partly new), March 13, 1734; *Pastor fido* (completely rearranged), June 4, 1734. In addition to his operatic labors, during this time he entered upon a path peculiarly his own. In consequence of certain semi-public performances of his oratorio "Esther," for the benefit of persons who had surreptitiously obtained a copy of the score, Handel, in Lent, 1732, "by his majesty's command" brought it upon the stage of the Haymarket (without action of course), having thoroughly revised it and made several additions. The king and all the royal family were present. It was given five times, and proved a powerful spur to Handel in that direction in which he stands above all other composers. The proprietors of the English opera, too, had recently brought out his "Acis and Galatea" with action, which led him to produce it also with large additions from his Italian serenata on the same subject, making of it a medley of both languages. The success of "Esther" induced him to try oratorio again, and he prepared "Deborah," which was given March 17, 1733. In July he conducted the performance of his third English oratorio, "Athaliah," at Oxford. During the same season the conduct of Senesino, his principal singer, was such that Handel discharged him; and as the composer refused to recall him, a coalition was formed against him, and a rival opera established, with Senesino, Farinelli, and Cuzzoni as principal vocalists, and Porpora and

Arrigoni as composers. Handel posted to Italy, engaged a good troupe, and opened the season of 1734 with three operas, the music of which was but arranged with new recitatives by him: *Semiramide*, *Cajo Fabrizio*, and *Arbace*. The season ended with the *Pastor fido*, and with it Handel's engagements with Heidegger. Oct. 5, 1734, he opened at Lincoln's Inn fields with revivals of *Ariadne* and *Pastor fido*, but soon removed to Covent Garden. The first work, mostly original, was *Terpsicore*, a sort of ballet interspersed with vocal music, followed by *Ariodante*, an opera, Jan. 8, 1735. During Lent he gave his three oratorios with organ concertos between the acts, and was ready on April 16 with another opera, *Alcina*. In the autumn Carestini, his first singer, was called by previous engagements to Italy, and during the succeeding winter Handel was forced to depend upon performances of "Esther" and "Acis and Galatea," with one new work, his magnificent music to Dryden's "Alexander's Feast." But succeeding in engaging Conti, a new singer of high reputation, he returned again to opera, producing *Atalanta*, May 12, 1736; *Arminto*, Jan. 12, 1737; *Giustino*, Feb. 16, 1737; and *Berenice*, May 18, 1737. Handel had tried every honorable means to achieve success. He had given old favorite operas revised, and new ones with extraordinary scenic effects; had prepared a *pasticcio* or two from the most popular music of his earlier works; had resorted to oratorio, and to the performance of concerts upon harpsichord and organ, wherein he was acknowledged by all to be absolutely without a rival. But London, which had not supported a single exotic opera, could not now, when the novelty was exhausted, encourage two; and with the failure of the *Berenice* his £10,000 were at an end, and his enemies had the satisfaction of having at length crushed him. But they too were exhausted. Handel closed his theatre in May; they followed in September. Farinelli had deserted them, and they closed their accounts with a loss of £12,000. Before Handel finally gave way to the pressure against him, his health had failed, and soon after the catastrophe an attack of paralysis prostrated him. His friends persuaded him to visit Aix-la-Chapelle; and once there his constitution triumphed; in six weeks he was restored, and returned to London to face his creditors and engage in gigantic labors to discharge his debts. On Nov. 1 he was again in London; on the 15th he began the opera *Faramondo*, for the younger Heidegger; on the 20th Queen Caroline died, and the king ordered a funeral anthem, which was completed in five days, one of Handel's grandest and most touching works; he then took up the opera again, and on Dec. 24 it was completed. *Faramondo* was produced in January, 1738, but was unpopular. On Feb. 25 *Alessandro Severo* followed, arranged from his other works, and on April 15 *Serse* (Xerxes), a new work. The great pub-

lie did not desert the composer in his trouble, although it refused to sustain the operatic enterprise of Heidegger. At a concert given "for the benefit of Mr. Handel," March 28, the net receipts were £800. At this period he was engaged to compose music for Vauxhall gardens, and the popularity of his music was such that Tyers, the proprietor, erected to his honor a marble statue by Roubiliac. Heidegger's operatic enterprise closed June 6, not to be renewed; and Handel gave his attention to other studies, preparing several of his organ concertos for publication, and composing the oratorios "Saul" and "Israel in Egypt," which were completed before the close of October. These two immense works were produced in the series of 18 oratorio performances of the succeeding winter and spring, the former Jan. 16, the latter April 4, 1739. For his 13 concerts in Lincoln's Inn fields during the season of 1739-'40 the new works were Dryden's "St. Cæcilia Ode" (not the "Alexander's Feast"), and Milton's "L'Allegro" and "Il Penseroso." The season of 1740-'41 comprised 14 performances, the new works being *Imeneo* (Hymen) and *Deidamia*, Italian operas which did not succeed. This closed his attempts to produce opera. The public would support neither him nor any other person at that time in giving opera in a foreign language. Discouraged at length, he determined to accept a long standing invitation from the lord lieutenant and other notables of Ireland and visit Dublin. For performances there he composed a new work to a text selected from the Bible. This was the "Sacred Oratorio," now known as the "Messiah." He reached Dublin Nov. 18, 1741, and began his first series of six concerts Dec. 23. A sacred series of six began Feb. 6, 1742, after which four supplemental performances were given, the second and fourth of which, April 13 and June 3, were the first public productions of the immortal "Messiah." The greatness of the work was immediately appreciated, and its author enjoyed once more the pleasure of a triumphant success. After a stay of nine months in Ireland, Handel returned to London crowned with success and honor. He seems now to have indulged for a time in a period of rest and inactivity; but in the spring of 1743 he gave a series of twelve oratorio performances (the "Messiah" occupying three, and a new work, "Samson," eight), with great success. For his season of 1744 the new works were the "Dettingen Te Deum," "Semele," and "Joseph and his Brethren," for that of 1744-'5, for which he had taken the Haymarket theatre, "Hercules," "Belshazzar," and a revival of "Deborah." But the faction of the nobility, especially a set of titled women, who placed Senesino higher than Handel, succeeded so far in curtailing the list of his subscribers as to render him unable to meet the great expenses he had incurred in producing his works upon the large stage of the Haymarket,

and on a scale of then unknown grandeur; and in the spring of 1745, after the 16th of the 24 performances advertised, he was forced to close his doors and again suspend payment. During the spring of 1746 he gave only the eight performances which were due to the subscribers of the year before, with but one new work, the "Occasional Oratorio," which, so far from being a *pasticcio*, as is often represented, contains in 37 pieces only six from older works. From this time onward Handel abandoned the plan of depending upon the subscriptions of the higher classes, throwing himself upon the generosity and musical taste of the general public. During the remainder of his life he gave every spring a series of 10 to 13 concerts, and with such success that he paid his debts to the uttermost farthing, and in little more than ten years accumulated £20,000. The new works of these latter years were: "Judas Maccabæus," 1747, which he gave six times; "Alexander," 1748; "Joshua," 1748; "Susannah," 1749; "Solomon," 1749; "Theodora," 1750; "Choice of Hercules," 1751; "Jephthah," 1752, the last of this stupendous series of dramatic oratorios. While at work on "Jephthah," which he began Jan. 15, 1751, and ended Aug. 30, his sight began to fail. Three operations were performed upon his eyes without success, and when the work was produced the next year, the grand old man was led into the orchestra blind. Thenceforward his pupil, John Christian Smith, aided him in conducting his oratorios, and acted as his amanuensis in the additions and changes which he still occasionally made in them. This was the case with the translation, with much added matter, of the *Il trionfo del tempo e del disinganno* of his youth, into the fine work, "The Triumph of Time and Truth." During the winter of 1758-'9 his health failed again; but although he felt himself rapidly drawing near the close of his life of intense activity, he opened his usual series of oratorios, March 2, with "Solomon," with "new additions and alterations," "Susannah," also with new additions and alterations, followed. "Samson" was given on the 14th, 16th, and 21st of the same month, and "Judas Maccabæus" on the 23d and 28th; on March 30 and April 4 and 6, the "Messiah." The performance on the 6th was the last at which the composer was present. On reaching his house he went to bed quite exhausted, and never rose from it. On the 17th anniversary of his first performance of the "Messiah," a little before midnight, he breathed his last, seven weeks after completing his 74th year. He was buried in Westminster abbey, and his statue is conspicuous among the monuments of the "poets' corner" of that edifice.—During the lifetime of the composer Pope called him the "giant Handel," an epithet the justice of which to this day every musician feels. His greatness was fully acknowledged by his contemporary Bach, and by the greatest that

have followed them in the musical profession. Beethoven did not hesitate to call him the greatest composer that ever lived. Handel possessed an inexhaustible fund of melody, of the richest and noblest character; an almost unparalleled power of musical expression; an unlimited command of all the resources of contrapuntal and fugal science; a power of wielding huge masses of tone with the most perfect ease and felicity. But perhaps his leading characteristic was the grandeur, majesty, and sublimity of his conceptions. He carried the old forms of opera to their highest perfection; infused a new life and power into English ecclesiastical music; was as an instrumental composer equalled by none but Bach, and in one direction surpassed all others who have written. We refer to the dramatic oratorio, of which, if not the creator, he was the perfecter, and reached a height in the "Messiah," "Israel in Egypt," "Samson," and "Judas Macabæus," whereon he stands alone. The problem he undertook to solve was that of giving such dramatic force and expression to the music in which he clothed his sacred texts, as to be able to dispense with all scenic and stage effects, and this he did with marvellous success. Making all due allowance for the thinness of his scores in comparison with those written for the modern orchestra, and for his occasional adaptations from other works, still the rapidity with which he produced his greatest compositions has hardly a parallel in musical history: "Atalanta" in 19 days; "Rinaldo" in a fortnight; "Alexander's Feast" in 17 days; concertante for nine instruments in one day; the "Messiah" in 23 days; and "Samson," begun only eleven days afterward, in 35.—Victor Schoelcher's elaborate biography of Handel appeared in London in 1857, and one by Chrysander at Leipsic (3 vols., 1858-'67). Mrs. Bray's "Handel, his Life, Personal and Professional," was published in London shortly after the great Handel festival at the crystal palace in June, 1857. The centennial anniversary of his death was celebrated in London on a gigantic scale in 1859. Many editions of his works, more or less complete, have been published; all others have been superseded by that of the German Handel society (25 vols., 1858-'66 *et seq.*). See also *Händel und Shakespeare* (Leipsic, 1868), and *Händel's Oratorientexte* (1873), both by Gervinus.

HANEBERG, Daniel, a German theologian, born at Tanne, June 17, 1816. He was consecrated a priest in 1839, and became a professor in the university of Munich. He was a successful instructor in the Old Testament, and a favorite preacher. In 1850 he entered the Benedictine monastery of St. Bonifacius at Munich, of which in 1854 he was chosen abbot. Among his writings are: *Ueber die arabische Palmenübersetzung des Saadia* (1840); *Die religiösen Alterthümer* (1842; 2d ed., 1866); *Ueber Schulwesen der Mohammedaner* (1850); *Geschichte der biblischen Offenbarung* (1850;

3d ed., 1864); *Erörterungen über Pseudo-Wakidi's Geschichte der Eroberung von Syrien* (1860); *Ueber die Theologie des Aristoteles* (1863); and a criticism upon Renan's *Vie de Jésus*, entitled *Renan's Leben Jesu* (1864).

HANGCHOW, or *Hangchow-foo*, a city of China, capital of the province of Chekiang, 2 m. from the Tsientang and about 40 m. from its mouth, 110 m. S. W. of Shanghai. It is situated on a plain at the S. terminus of the imperial canal, giving it water communication with Peking and a large internal trade, while the river, 4 m. broad opposite the city, affords communication with the southern parts of the empire. Until recently it was one of the largest and richest cities of China, with an estimated population of 700,000, of whom more than 60,000 were employed in silk manufactures. Till 1861 it was the great resort for literary and religious men, and colleges and temples were numerous. But a small portion of the people, including a garrison of 7,000 troops, reside within the walls, the rest living in the suburbs, which are extensive and beautiful, and in boats, with which the adjacent waters are thronged. The streets, though narrow, are well paved and clean; arches and public monuments abound, and the shops once vied with those of European capitals in the display of gold and silver ornaments, and silks and embroideries, for which the city was particularly famous; while the residence of the court and the immense trade passing through it increased its wealth and importance. During the latter part of the Sung dynasty (960-1279) it was the metropolis of the country. Marco Polo describes it at the end of the 13th century as "preëminent above all cities in the world in point of grandeur and beauty." Until it was captured by the rebels, Dec. 28, 1861, it was the residence of the governor and general of Chekiang and Fokien, and of the governor of the province. The rebels held it three years, during which they plundered and impoverished the place and drove out a great number of the inhabitants. The imperialists recovered it, March 31, 1864, and since then many of the inhabitants have returned, and the city is recovering something of its former prosperity.

HANG-NEST. See BALTIMORE BIRD.

HANGÖ, or *Hangö-Udd*, a seaport of Russia, on the coast of Finland, about half way between Helsingfors and Abo, on a tongue of land the extremity of which forms Hangö Head or Cape Hangö. The population is small, but the place derives importance from its harbor being free from ice excepting during about one month of the year, owing to the warm currents from the gulf of Bothnia. It has been declared a free port, and a railway connecting it with St. Petersburg was opened Oct. 8, 1873. The mole is built of granite, and runs out into the harbor for 150 yards, with a depth of 40 ft. on both sides. Owing to the natural advantages of the railway and to the cheapness of labor, it carries freight at a lower rate than the shorter routes

from Revel and the Baltic ports.—The Swedes were defeated here in 1713 by the Russians.

HANIFAH (commonly called **ABU HANIFAH**), the founder of the Hanifites, the most ancient of the four sects of orthodox Mussulmans, born at Kufah in 699, poisoned in 767. He early gained distinction from his knowledge of theology and law, but was equally eminent for his personal qualities. He did not accept the doctrine of absolute predestination, and was thrown into prison by the caliph. Subsequently he opposed the caliph's persecution of the inhabitants of Mosul, and was compelled to take poison. A mausoleum was built for him in 1092. He taught that the sins of the faithful are not annulled, and that it is possible for them to fall into transgression. He wrote a famous commentary on the Koran, entitled *Seved*, or "The Help."

HANKA, Venceslav, a Bohemian philologist, born at Horzeniowes, June 10, 1791, died Jan. 12, 1861. He had made himself popular by several poetical productions in Czechic, when he became famous by the discovery in 1817 (the genuineness of which is, however, still contested) of the "Manuscript of Königinhof" (*Rukopis kralodvorsky*), a collection of Czechic poems supposed to have been written about the beginning of the 14th century. He was appointed in 1818 librarian of the national museum of Prague, and in 1849 professor at the university. He is the author of a number of important grammatical, lexicographical, and critical works on the Bohemian and other Slavic languages and literature.

HANKEL, Wilhelm Gottlieb, a German natural philosopher, born at Ermsleben, May 17, 1814. In 1833 he entered the university of Halle, where he began the study of theology, but soon devoted himself to science. In 1835 he became assistant in the cabinet of the university, and in 1836 teacher of science in the school of the orphan house. In 1847 he was appointed extraordinary professor in the university of Halle, and in 1849 ordinary professor at Leipsic. He is especially noted in connection with electricity and magnetism, and has published *Elektrische Untersuchungen* (parts 1-6, Leipsic, 1856-'65).

HANKOW, a city of China, in the province of Hupeh, on the Yangtse-kiang, 470 m. W. of Shanghai; pop. estimated at 800,000. The river Han, which here falls into the Yangtse, separates Hankow from Hanyang, and opposite both, on the other bank of the Yangtse, is Wochang, the capital of Hupeh. These three towns are said to have had, before they were almost wholly destroyed by the Taepings, an aggregate population of 5,000,000. In consequence of its flourishing trade, Hankow is now again one of the first commercial cities of the Chinese empire, and in particular the centre of the commerce of the provinces of Hupeh, Honan, Sechuen, and Kweichow. It is one of the treaty ports opened to foreign commerce. Two regular lines of steamships connect it with

Shanghai. For the trade with Russia, Hankow is next to Tientsin the most important place. The imports in 1871 were valued at \$187,000, the exports at \$5,112,000. The most important articles of export are tea, China grass, hemp, tobacco, and rhubarb; the most important articles of import are Russian cloth and velvets. The number of vessels entering the port in 1869 was 286, tonnage 185,226; cleared, 350, tonnage 191,088.

HANLEY, a town of Staffordshire, England, forming with the township of Shelton a municipal borough, 1 m. N. of Stoke-upon-Trent, and 149 m. N. W. of London; pop. in 1871, 39,976. It is in the centre of the pottery manufacturing district, in which business the inhabitants are chiefly employed, and to which the rapid increase of population (which in 1881 was only 7,121) is mainly due. The town, situated on a rising eminence, has wide, well paved streets, and is lighted with gas and supplied with water. It has a handsome town hall, public library, mechanics' institute, and several large markets. An important cattle market is held here every fortnight.

HANNAY, James, a British author, born in Dumfries, Scotland, Feb. 17, 1827, died in Barcelona, Spain, Jan. 9, 1874. He entered the navy at the age of 13, but left it after five years, and devoted himself to literature. He contributed to various periodicals, and from 1860 to 1864 was editor of the "Edinburgh Courant." In 1857 he was an unsuccessful candidate for parliament for Dumfries. In 1868 he was appointed consul at Barcelona. His works include "Biscuit and Grog" (1848), "Hearts are Trumps" (1848), "King Dobbs" (1849), "Singleton Fontenoy" (1850), "Satire and Satirists" (1853), "Sand and Shells" (1854), "Eustace Conyers" (1857), "A Course of English Literature" (1866), and "Three Hundred Years of a Norman House" (1867).

HANNIBAL, a city of Marion co., Missouri, on the W. bank of the Mississippi, 132 m. above St. Louis, and 90 m. N. N. E. of Jefferson City; pop. in 1850, 2,020; in 1860, 6,505; in 1870, 10,125, of whom 1,616 were colored and 1,632 foreigners. It is the eastern terminus of the Hannibal and St. Joseph and the Missouri, Kansas, and Texas railroads, one of the western termini of the Toledo, Wabash, and Western, and the Chicago, Burlington, and Quincy lines, and a station on the Mississippi Valley railroad. Hannibal is the only point on the Mississippi S. of Keokuk where a bridge adapted for both railroad and wagon travel spans the river. It is favorably situated for commerce, is rapidly increasing, and is the shipping point for large quantities of tobacco, pork, flour, and other produce. Coal and limestone abound in the vicinity, and the manufacture of lime is a prominent business. With the exception of St. Louis, it is the most extensive lumber market W. of the Mississippi, and has a large trade in this article with Kansas and Texas. It contains a city hall, two banks with

a capital of \$250,000, a savings bank, several large tobacco factories, pork-packing houses, flour mills, saw mills, founderies and car works, and 14 extensive lumber yards. Hannibal college was established in 1868, under the auspices of the Methodist Episcopal church South, and in 1872 had 5 professors and 35 preparatory and 73 collegiate students. There are 6 public schools, including a high school, having in 1872 25 teachers and 1,035 pupils; several private schools, a Roman Catholic seminary, a daily and weekly newspaper, a monthly periodical, and 13 churches.

HANNIBAL, or **Annibal** (in Punic, probably, "favorite of Baal"), a Carthaginian general and statesman, born in 247 B. C., died in Nicomedia, Bithynia, in 183. He was the son of Hamilcar Barca, the Carthaginian hero of the first Punic war and leader of the popular party in his state; and the first years of his life were spent amid the impressions caused by the achievements of his father, the disasters which terminated that protracted struggle against Rome, and the horrors of the military mutiny which followed it. Having quelled this mutiny, and prepared for the conquest of Spain, Hamilcar, designing to take with him his son, then a boy of nine years, led him before their departure to an altar, and made him swear eternal enmity to the Romans. Spain, which Hamilcar and his son-in-law and successor in command Hasdrubal conquered as far as the Ebro, was an excellent school of war for Hannibal; and when the young general took the command, on the death of his brother-in-law (221), he possessed all the qualities which could promise success to the great military and political schemes of the house of Barca. His first task was to complete the conquest of the country south of the Ebro. After a few victories, Saguntum (now Murviedro in Valencia) alone remained to be subdued. This city, a Greek colony, was an ally of Rome; but this was only another inducement for Hannibal to attack it, and at the head of 150,000 men he was strong enough to undertake the siege against the will of his government and the wish of the predominant party in Carthage. Saguntum, after a defence of eight months, characterized by that desperate valor which has marked the struggles of so many cities in ancient as well as modern Spain, fell while Rome was still deliberating on its rescue (219). Hannibal stained his victory by cruelty, but the rich booty sent to Carthage silenced the accusations of his enemies and augmented the number of the friends of war. Rome demanded in vain the surrender of the young general, and at last through her envoy, Quintus Fabius Maximus, declared war. Thus the second Punic war was begun. Unlike the first, which was waged chiefly for the possession of the islands of the Mediterranean, the genius of Hannibal made it a struggle for the destruction of Rome, which he hoped to achieve by an invasion of Italy from the north, and with the assistance of the

half subdued subjects of the tyrannical republic, of whom the Insubrian and Boian Gauls had secretly promised a revolt. Having secured the coasts of Africa by an army of Spaniards, and Spain by another of Africans under his brother Hasdrubal, he started from New Carthage (now Cartagena) in the spring of 218, with 90,000 foot, 12,000 horse, and 37 elephants, crossed the Ebro, subdued in a series of bloody struggles the warlike tribes of northeastern Spain, and passed the Pyrenees, leaving Hanno to guard the passes, and dismissing thousands of native Spanish troops to show his confidence of success. His army was now reduced to 59,000 men, with whom he speedily traversed the country between the Pyrenees and the Rhône, crossed that river, unchecked by the hostile Massiliotes, old allies of Rome, and their warlike Gallic neighbors, and, avoiding the cavalry of P. Cornelius Scipio the elder, who had landed on the coast of Gaul, marched up the Rhône and Isère, and through the comparatively level peninsula of the Allobroges between those two rivers to the Alps. It is now generally believed that he crossed the Graian range by the Little St. Bernard, which agrees with the relation of Polybius; but some still hold that his route was across the Cottian range by Mt. Cenis (as Livy relates), or Mt. Genève. The stormy autumn weather and the treachery of the Centrones, a Gallic tribe, greatly augmented the natural horrors of this 15 days' passage of an army consisting in part of horsemen and elephants along narrow paths, between precipices and avalanches, over rocky peaks and ice fields lightly covered with snow. But the spirit of the general proved equally ingenious in baffling the unexpected assaults of the Gauls, and in contriving artificial means for transporting the army with its trains. Of this, however, no more than 20,000 foot and 6,000 horse could be mustered in the valleys of the Dora Baltea. But the Insubrians and Boians had kept their promise and risen against the Romans; they now readily joined his banners. Having captured Taurinium (Turin), which was hostile to the Insubrians, he defeated Scipio, who had returned with a part of his army from Gaul to meet him on his descent from the Alps, in a cavalry engagement on the Ticino. It was his first battle against Romans, and the first in Italy; and knowing the importance of the first impression, he had inspired his brave Numidian cavalry by a fiery speech. The consul retreated toward the fortified town of Placentia (Piacenza), but could not prevent his colleague T. Sempronius, after his arrival from Sicily, from accepting a battle on the Trebia, in which the Romans were entrapped into an ambushade by Mago, the younger brother of Hannibal, and completely routed. Only a part of their army escaped toward the fortresses of the Po. The campaign of the year 218 had thus been a succession of triumphs for Hannibal from the Ebro

to the Trebia. The Romans now armed to defend the lines of the Apennines, sending Servilius and Flaminius, the new consuls of the year 217, to Umbria and Etruria, on either of which an attack was expected. Hannibal chose a western passage over the mountains, where he lost all his remaining elephants but one, and having crossed the marshy environs of the Arno, during which perilous march he lost his right eye, he passed by the camp of Flaminius at Arretium (Arezzo), and finally enticed him from his position into a defile between Cortona and Lake Thrasymenus (now the lake of Perugia), where the Romans were suddenly attacked by the Carthaginians in front and rear. Half of the Roman army, together with the consul, perished by the sword or in the lake, and the other half was captured. Four thousand horsemen, the vanguard of Servilius, who was hastening from Umbria to aid his colleague, arrived only to meet the same fate. Rome trembled, and imagined Hannibal already before its gates. (*Hannibal ante portas* became afterward a proverb.) Q. Fabius Maximus Verrucosus was proclaimed dictator by the senate, and the city was fortified. But the conqueror, who knew Rome and the power of its despair, having made an unsuccessful attempt to besiege Spoletum, resolved to detach the subjects and allies of Rome from its interest before attacking the city itself. He therefore crossed over to Picenum, and carried terror and devastation into the lands of the faithful confederates of Rome in central Italy. Fabius now marched against him, and, with that cautious slowness which won him the surname of Cunctator (the Delayer), closely followed all his motions, hovering around him like "a cloud on the mountains," deterring the towns from defection, but carefully avoiding the risk of a decisive battle. By thus keeping Hannibal continually at bay, he procured Rome time for greater armaments. Once he had even the good fortune to surround him closely in a narrow mountain pass; but Hannibal saved himself by having 2,000 oxen with burning fagots around their horns driven upon an eminence, which, making the enemy believe that a sally was intended on that side, induced him to quit one of his main positions. Dissatisfied with the slowness of Fabius, Minucius, his master of the horse, attacked the enemy in his absence at Geronium, and for a trifling success was rewarded by the people of Rome with an equal share in the supreme command. This emboldened him to attempt another attack, and he was soon ensnared and routed by Hannibal, being saved from total ruin only by Fabius, who hastened to the rescue of his rival. Hannibal regarded this as a defeat by Fabius. "I told you," he said, "the cloud of the mountains would shed its lightnings." He wrote to Carthage for reinforcements and money; the government refused to send any, for none were needed, his enemies said, after such victories. Hasdru-

bal, his brother, was fully engaged in Spain by the brothers P. Cornelius and Cneius Scipio. A decisive battle was deemed necessary by Hannibal to destroy the Roman confederacy. The rashness of C. Terentius Varro, one of the consuls of the year 216, soon offered an opportunity for striking a great blow, of which Hannibal well knew how to avail himself. The battle was fought in Apulia, near Cannæ, on the banks of the Aufidus (Ofanto). The two consuls, L. Æmilius Paulus and Varro, commanded more than 80,000 men; the Carthaginian generals, Hannibal, Mago, Maharbal, Hanno, and another Hasdrubal, 50,000. Skilful disposition, stratagem, and the Numidian cavalry decided the day in favor of the Carthaginians. Æmilius Paulus, who died the death of a hero, 21 military tribunes, 80 senators, and numberless knights were among the 50,000, or, according to others, 70,000 Roman victims of the carnage. Only scattered remnants escaped, among them Varro, who now received the thanks of the senate *quod de republica non desperasset*. This indomitable spirit of the Romans, as well as his own heavy loss, still prevented Hannibal from following the advice of Barca to march immediately upon Rome. He was for the present satisfied with the possession of southern Italy, and entered Capua, which opened its gates, to give rest to his troops. But the rich and luxurious metropolis of Campania proved fatal to their discipline and health, and desertion thinned their ranks. Hannibal had passed the zenith of his good fortune. Marcellus, the sword of Rome, while Fabius continued to be its shield, repulsed him from Nola, and besieged and conquered Syracuse (214-212), a newly gained ally of Hannibal, while another ally, Philip of Macedon, was prevented from fulfilling his promises of aid. Hasdrubal in Spain fought with varying success, P. Cornelius Scipio, the son, recovering what his father and uncle had lost when they fell. Sardinia and the whole of Sicily were soon in the hands of the Romans, who began to harass the coasts of Africa. While Hannibal was effecting his successful march to Tarentum and its occupation (212), other towns were lost. Capua was besieged and hard pressed. Unable to dislodge the besiegers, he suddenly marched toward Rome, and really appeared before its gates (211), but this diversion remained fruitless. The siege of Capua was not raised, and both that city and Tarentum were lost; and after a victory at Herdonea (210), Hannibal had to keep himself on the defensive in Apulia, Lucania, and Bruttium. His most dangerous enemy, Marcellus, however, fell into an ambuscade near Venusia, and was slain (208). This was one of Hannibal's last achievements in Italy. His hopes rested on the approach of his brother from Spain with a mighty army; but the consuls Livius and Claudius Nero, the latter of whom secretly hastened from the south, where he was observing Hannibal, to aid his colleague in the north, de-

stroyed in the battle on the Metaurus (207) the new army and every hope of Carthaginian success. Hannibal, into whose camp the head of his brother was thrown by the Romans, now despaired of the result, but still continued the struggle, at least for the military honor of his country, in Bruttium, the southernmost peninsula of Italy, until he was recalled in 203 to Africa, which was now invaded by Scipio, the conqueror of Spain. Immediately on his return, after so many years of absence and victories, he created a new cavalry, and defeated Masinissa of Numidia, the ally of Scipio, but tried to induce the latter to negotiate. The statement that an interview occurred between Hannibal and Scipio is discredited by some historians. At all events, if they had an interview, it was without results. Hannibal was obliged to accept a battle at Zama (202), in which his large but motley host of Carthaginians, Libyans, Ligurians, Gauls, and Macedonians succumbed to the less numerous but well organized and disciplined army of Scipio. The terror of an eclipse of the sun, and a panic among the mercenaries, chiefly caused this crushing defeat. The second Punic war was soon over; Rome dictated cruel and humiliating terms of peace, and Carthage accepted them (201). But Hannibal's career was not yet ended. Removed from military command through the influence of the Romans, he soon rose to the highest civil dignity in his state, and as *suffete* he evinced the same energy, boldness, and genius which distinguished him as a general. He detected, denounced, and abolished inveterate abuses, reformed the judiciary, reorganized the finances, restored the resources of the republic, and concluded new alliances. But his hostility to the embezzlers of the public revenues and monopolizers of offices increased and embittered his personal enemies, who denounced his patriotic schemes at Rome, and with a Roman commission sent to Africa even concerted a plot against his life. He sought safety in flight, escaped from the city, sailed to Tyre, and thence went to the court of Antiochus the Great of Syria, whom he soon induced to declare war against the Romans. But though the king treated him with the utmost honor, he was prevented by intrigues, and by jealousy of Hannibal's glory, from adopting his grand plans of a combined attack on Rome in Italy, as well as from giving him a proper share in the execution of his own. He was made commander of a fleet sent against the Rhodians, but failed in the expedition, though he personally distinguished himself. The Romans, having compelled Antiochus to an inglorious peace, asked the surrender of their old enemy, who was, however, informed in time to escape. He repaired to the court of Prusias, king of Bithynia (187), passing, it is said, through Gortyna in Crete, where he saved his treasures by placing sealed casks filled with lead under the protection of the avaricious inhabitants, while his gold lay concealed in hollow statues on the open

floor of the vestibule. Anxious to induce Prusias to aid him in his plans against Rome, he is said to have gained a victory over the fleet of his enemy Eumenes of Pergamus. There, too, the Romans persecuted him; and no less a person than T. Q. Flamininus was sent to ask his surrender, and the Bithynian king was weak enough to command the arrest of his guest. But Hannibal was not unprepared, and determined to die a free enemy, and not a slave of the Romans. He took poison, and in his last hour expressed his contempt of his victorious but degraded enemies, and uttered imprecations on Prusias, their treacherous accomplice. He had kept his oath.

HANNO, a Carthaginian navigator of the 5th or 6th century B. C. He was commissioned by the government of Carthage to explore the western coast of Africa, and to plant colonies there. Setting sail accordingly with 60 penteconters (vessels of 50 oars each), carrying 30,000 men and women, he passed the pillars of Hercules, and voyaged along the African coast as far as lat. 8° N., according to some writers. On returning to Carthage he caused an account of his voyage to be inscribed on a tablet, and then dedicated it in the temple of Saturn. It seems to have been written in the Punic language; the version of it which remains is only a Greek translation. According to this tablet, known as a *Periplus*, it appears that one city was built not far from the strait of Gibraltar, and a few others along the coast, reaching to Cape Bojador. The first edition of Hanno's *Periplus* appeared at Basel in 1534, as an appendix to the edition of Arrian by Gelenius. It has also been published by Hudson in the first volume of his *Geographi Minores* (Oxford, 1698); and in 1797 an English translation of it by Falconer was issued from the Oxford press. It is still an open question at what time this Hanno lived, whose son he was, and how much of the statements of the *Periplus* can be regarded as trustworthy. Some authorities believe him to be either the father or the son of the Hamilcar who fell at Himera in 480 B. C. Others compute that the voyage was made about 570. The *Periplus* has recently been cited as evidence of the existence of the gorilla in those days.

HANNO, surnamed the Great, a Carthaginian general and statesman, contemporary with Hamilcar Barca and Hannibal, died in old age, after the battle of Zama, 202 B. C. While yet a very young man he commanded a division of the Carthaginian army in Africa during the first Punic war, and took Hecatompylus, an opulent city of that continent. When the mercenaries returned from Sicily after the termination of the first Punic war, Hanno was deputed to propose to them that they should waive their right to a part of the arrears due them; and when they refused to accede to this and took up arms to enforce their claim, he was appointed to command the army sent to subdue them. His military abilities were not equal to the accomplishment of the enterprise,

and in a little time Hamilcar, his political rival and opponent, was associated in the command with him. Hanno was afterward superseded by the suffrages of the soldiers, and a new colleague given to Hamilcar. This new general being soon after taken prisoner and killed by the mutineers, a formal reconciliation was effected between the two rivals, and Hanno was restored to his command. The fortune of war now turned against the mercenaries, who were defeated in a great battle, stripped of their strongholds, and at length completely subdued. From the termination of this war Hanno figures rather as a politician than a warrior. He was the head of the aristocratic party at Carthage, and the great enemy of Hamilcar and his sons, whose policy he invariably opposed.

HANOVER, an E. county of Virginia, drained by North Anna and South Anna rivers, which unite on its N. E. border to form the Pamunkey; area, 400 sq. m.; pop. in 1870, 16,455, of whom 8,562 were colored. The surface is uneven, and the soil much diversified and capable of being improved. The Richmond, Fredericksburg, and Potomac, and the Chesapeake and Ohio railroads traverse the county. The chief productions in 1870 were 122,593 bushels of wheat, 225,517 of Indian corn, 119,211 of oats, 29,278, of Irish and 35,775 of sweet potatoes, 439,434 lbs. of tobacco, and 72,013 of butter. There were 1,468 horses, 983 mules and asses, 2,175 milch cows, 1,303 other cattle, 2,260 sheep, and 8,426 swine; 15 flour mills, and 4 saw mills. Capital, Hanover Court House.

HANOVER. I. A town of Grafton co., New Hampshire, on the E. bank of the Connecticut river, opposite Norwich, Vt., with which it communicates by a bridge, 50 m. N. W. of Concord; pop. in 1870, 2,085. The surface is in some parts uneven, but the greater portion is admirably adapted for agriculture. The soil is fertile, and there is probably less waste land in Hanover than in any other part of the county. The Moose mountain, an elevated ridge, runs across the town from N. to S. about 5 m. from the Connecticut. The Connecticut and Passumpsic Rivers railroad passes on the opposite side of the river. The principal village is situated about $\frac{1}{2}$ m. from the river, on an elevated plain, and is built around a public square of six acres, on which front the principal edifices. It is the seat of Dartmouth college. (See DARTMOUTH COLLEGE.) The town contains a national bank, a hotel, two post offices (Hanover and Hanover Centre), 18 public schools (two graded), a monthly periodical published by the college students, and four churches. II. A town of Jefferson co., Indiana, on the Ohio river, 5 m. below Madison, and 80 m. S. E. of Indianapolis; pop. in 1870, 564. It occupies a healthy situation on a high bluff, and is surrounded by fine scenery. It is the seat of Hanover college (Presbyterian), established as Hanover academy in 1827, and chartered as a university in 1833. The college grounds embrace more than 200

acres, and contain the president's house, a professors' residence, and a college building 200 ft. long by 80 ft. in breadth. The property and endowment amount to \$275,000. The college embraces a collegiate and a preparatory department, each comprising a classical and a scientific course. Tuition is free. In 1872-'3 there were 9 professors, 2 tutors, and 134 students; total number of graduates, 403.

HANOVER (Ger. *Hannover*). I. A N. W. province of Prussia, between lat. $51^{\circ} 17'$ and $53^{\circ} 51' N.$, and lon. $6^{\circ} 40'$ and $11^{\circ} 32' E.$ It is bounded mainly by the North sea, the grand duchy of Oldenburg, the province of Schleswig-Holstein, the grand duchy of Mecklenburg-Schwerin, the provinces of Brandenburg and Saxony, the duchy of Brunswick, the provinces of Saxony, Hesse-Nassau, and Westphalia, and the kingdom of the Netherlands. Area, 14,856 sq. m.; pop. in 1871, 1,963,618, of whom about 230,000 were Roman Catholics, 12,000 Jews, and the remainder Protestants. More than one half the population are engaged in agriculture, and about one fourth in mining and manufactures. The surface is flat, except in the S. part, which is covered by the Hartz mountains, some of the peaks of which reach an elevation of 3,000 ft. The principal rivers are the Elbe, which with its tributaries drains the N. E. boundary, the Ems, traversing the W. portion, and the Weser, with its tributaries draining the E. portion. Among the lakes are the Dümmersee, the Steinhudermeer, and the Seeburgersee. The climate generally is mild, except in winter in the high regions of the south. The greatest heat is $93^{\circ} F.$, the greatest cold -29° , and the mean temperature 45° . About one sixth of the surface is covered with forests, chiefly oak, beech, and fir; the alluvial flats are natural meadows yielding large crops of hay, or are grazing grounds for vast herds of cattle; more than one fourth of the surface is arable, and is carefully cultivated. The moors and heaths of the lowlands in the north have deep peat beds, which provide fuel for nearly the whole population, and \$200,000 worth of it is sent yearly to Hamburg and Bremen. The chief agricultural products are barley, rye, oats, buckwheat, flax, hemp, potatoes, chicory, garden vegetables, and some fruit. The domestic animals, generally of good breeds, in 1869 numbered 212,905 horses, 863,362 cattle, 572,366 hogs, 158,203 goats, and 2,156,920 sheep, of which 244,095 were merinos. Bee keeping is an important industry, and in 1869 there were 213,870 hives. Poultry is plentiful, and immense numbers of geese are reared in the marshes. Game abounds in the Hartz mountains. Of river fish, the sturgeon is the most valuable; the sea fisheries of herring and haddock are extensive. The mineral wealth of the southern districts is considerable; in 1869 the coal mines yielded about 1,000,000 tons; the value of iron, zinc, copper, silver, and lead ores mined was \$1,500,000, but this does not

represent the exact value, as the profits of a portion of the Hartz mines are divided by Prussia and Brunswick in the proportion of 4 to 3. The annual yield of asphaltum is about 2,500 tons, and some gold is found. In some localities rock salt is mined in large quantities; and there are also extensive slate and sandstone quarries. There are large smelting works and founderies in the vicinity of the mines. The export of linen goods in 1869 amounted to \$7,000,000. The province has more than 1,000 breweries and distilleries, nearly 200 manufactories of woollen goods, several large cotton factories, 20 glass works, besides many manufactories of mirrors, 110 tanneries, 40 paper mills, chemical works which furnish immense quantities of vitriol, sulphuric acid, sal ammoniac, and sugar of lead, India-rubber works, and powder mills. The gun makers of Hanover and Herzberg, and the physical, optical, and mathematical instrument makers of Göttingen, have a European reputation. The province has 95 m. of canals, 650 m. of navigable rivers, and 565 m. of railways. In 1871 the merchant marine of Hanover consisted of 881 sailing vessels of 112,976 tons, 4 steamships of 823 tons, 563 coasters of 21,120 tons, and 2,246 river vessels of 71,982 tons. The principal ports are Harburg, Geestemünde, Norden, and Emden. The principal educational institution is the university of Göttingen. The Protestants have 3,200 public schools, with 4,050 teachers and 280,000 pupils; the Roman Catholics, 425 public schools, with 500 teachers and 35,000 pupils; the Jews, 80 schools, with 90 teachers and 1,750 pupils. For administrative purposes the province is divided into 6 *Landdrosteien* and 37 circles; the head of each of these administrative divisions is appointed by the Prussian government. The province has a local government of 75 elected assemblymen, with 6 hereditary members, under a president appointed by the crown, and this body legislates on all provincial matters.—The early history of the territory now included in the province will be found under SAXONY. Charlemagne introduced Christianity with his sway, and his family held the Saxon duchy till 951, when it passed to Hermann Billung, in whose family it remained till the death of Magnus in 1106. It was then bestowed by the emperor Henry V. on Lothaire of Supplenburg, who became his successor in the empire, and died in 1137. His son-in-law Henry, duke of Bavaria, of the house of Guelf, succeeded in Saxony, and by marriage into the house of Billung acquired the duchy of Lüneburg, and subsequently he added Brunswick, Göttingen, and other principalities. His son, Henry the Lion, made considerable additions to the territory. After his death in 1195, of his three sons who succeeded, only the third, William, left male heirs, through whom were formed in the 13th century the houses of Brunswick-Wolfenbüttel and Brunswick-

Lüneburg. (See BRUNSWICK, HOUSE OF.) A prince of the latter house, Ernest Augustus, was created elector of Hanover in 1692. His wife, Sophia, daughter of the elector palatine Frederick V. and of Elizabeth, daughter of James I. of England, was declared next heir to the British crown, after Mary, William III., Anne, and their descendants. His son, George Lewis, succeeded in 1698, and in 1714 became king of Great Britain as George I.; and his successors retained both governments till the accession of Victoria. In 1715 Hanover purchased the principalities of Bremen and Verden. Hanover cooperated with Maria Theresa in the wars of 1740-'45, with England in the seven years' war (1756-'63), and was occupied by the French in 1757. In 1801 it was occupied by the Prussians, and in 1803 by the French, who ceded it to Prussia in 1805, retook it in 1806, and annexed part of it to the kingdom of Westphalia in 1810; after the battle of Leipsic in 1813 it was restored to the elector-king. In 1814 the congress of Vienna made it a kingdom and enlarged its territory. On the accession of Victoria to the throne of Great Britain in 1837, Hanover by the Salic law was separated from the British crown, and Ernest Augustus, brother of William IV., became king. The fifth and last king of Hanover was his son George V., who succeeded in 1851. In the war of 1866 Hanover sided with Austria, and was occupied by Prussia in June. The Hanoverians defeated the Prussians at Langensalza on June 27, but surrendered on June 29. Hanover was annexed to Prussia in September. (See GEORGE V.) II. A city, capital of the province, at the confluence of the Ihme and the Leine, 64 m. S. E. of Bremen and 84 m. S. by W. of Hamburg; pop. in 1871, 87,641. The river Leine divides the old and new towns, which are connected by 11 bridges. The old town was formerly fortified, but the ramparts were demolished in 1780. After the city became the royal residence in 1837, it was greatly improved, and since it fell to Prussia in 1866 the old town is rapidly disappearing, the quaint structures of former years giving place to warehouses and modern residences. Among the noteworthy public buildings are the Kreuzkirche and the Marktkirche, built in the 14th century, the city hall, built about 1455, and the Aegidienkirche, probably 400 years old, restored in 1827. Some of the finest buildings are in the vicinity of Waterloo square, which contains a column about 170 ft. high, surmounted by a statue of Victory and inscribed with the names of the Hanoverians who fell at Waterloo. On the N. side of the square is the former royal palace, built in 1640, from which the treasures were removed by the ex-king to Vienna in 1866. The city has a public library of 40,000 volumes, a royal library of 150,000 volumes and 2,000 manuscripts, a number of Lutheran and Roman Catholic churches, a synagogue, many charitable and educational institutions, and numerous manufactories.

HANOVER COURT HOUSE, Battle of. See CHICKAHOMINY, vol. iv., p. 411.

HANSEATIC LEAGUE (Old Ger. *Hansa*, a union), a commercial alliance of certain Germanic cities in the middle ages, for the protection of trade. In the early part of the 13th century society in northern Europe was in a rude stage. The shores of the Baltic were occupied by Slavic tribes. Commerce, where it existed, was viewed by the sovereigns as something to supply their own rapacity, rather than as a benefit to the realm. Petty lords followed the example of the sovereigns and levied exactions under the pretence of giving protection. The maritime cities of Germany were the chief sufferers, especially those on the Elbe. The Genoese and Venetians possessed the monopoly of the Mediterranean and the East, and made those cities the depots of their northern traffic. The rich cargoes continually passing gave birth to swarms of pirates, who infested the Baltic. In 1239 an agreement was entered into between Hamburg, Ditmarsh, and Hadeln, to take means to keep the course of the Elbe and the adjacent sea free of marauders. This was the beginning of the Hanseatic league, although it is usually dated from the compact between Hamburg and Lübeck, in 1241, to provide ships and soldiers to clear the traffic way between the rivers Elbe and Trave, and the waters from Hamburg to the ocean, and further to promote their mutual interests. When this partnership had been in operation six years, the city of Brunswick joined it. Other cities speedily sought admission, with their quota of men and money. The progress of the league was rapid. By 1260 it had so expanded that a convention was summoned to regulate its affairs, and thereafter its diet assembled triennially, with an extraordinary meeting decennially to renew the league. Lübeck was named the capital of the Hansa, and depository of the common treasury and archives. Usually the meetings were held at Lübeck, but occasionally at Hamburg, Cologne, and elsewhere. The cities of the alliance were organized for administrative purposes into four circles: 1, the Vandalic or Wendish towns of the Baltic; 2, the Westphalian, Rhenish, and Netherlandish towns; 3, the Saxon and Brandenburg towns; 4, the Prussian and Livonian. The capitals of these circles were Lübeck, Cologne, Brunswick, and Dantzic. The number of cities belonging to the league fluctuated, but at the height of its power it comprised the following 85: Andernach, Anklam, Aschersleben, Bergen, Berlin, Bielefeld, Bolsward, Brandenburg, Braunsberg, Bremen, Brunswick, Buxtehude, Campen, Colberg, Cologne, Oracow, Culm, Dantzic, Demmin, Deventer, Dorpat, Dortmund, Duisburg, Eimbeck, Elbing, Elburg, Emmerich, Frankfort-on-the-Oder, Gollnow, Goslar, Göttingen, Greifswald, Groningen, Halberstadt, Halle, Hamburg, Hameln, Hamm, Hanover, Harderwyk, Helmstedt, Hervorden, Hildesheim, Kiel, Königsberg, Kösfeld, Lemgo, Lixheim, Lübeck, Lüneburg, Mag-

deburg, Münden, Münster, Nimeguen, Nordheim, Osnabrück, Osterburg, Paderborn, Quedlinburg, Revel, Riga, Roermond, Rostock, Rügenwalde, Salzwedel, Seehausen, Soest, Stade, Stargard, Stavoren, Stendal, Stettin, Stolpe, Stralsund, Thorn, Uelten, Unna, Venloo, Warburg in Sweden, Werben, Wesel, Wisby, Wismar, Zutphen, and Zwolle. These cities were represented by delegates. The edicts of the assembly were communicated to the magistrates at the head of each circle, and were enforced with the strictness of sovereign power. Besides the ordinary members of the league, other cities were more or less affiliated with it, but without representation or share in the responsibilities. Among the latter were Amsterdam, Antwerp, Dort, Ostend, Rotterdam, Bruges, Dunkirk, Bayonne, Bordeaux, Marseilles, Rouen, St. Malo, Barcelona, Cadiz, Seville, Lisbon, Naples, Leghorn, Messina, and London; but in the 14th century the kings of France and other potentates of the south ordered their merchants to withdraw from the association. The objects of the league were in the beginning the protection and expansion of commerce, the prevention of piracy and shipwreck, the increase of agricultural products, fisheries, mines, and manufactures. With these views they established four great factories or depots of trade: at London, in 1250; Bruges, 1252; Novgorod, 1272; and Bergen, 1278. From these centres they were able almost to monopolize the trade of Europe. Their factories were conducted with all the rigor of monastic establishments, the officers being bound, among other things, to celibacy and common board. The London factory, with branches at Boston and Lynn, gave the Hansards, as the merchants of the league were called, command both of the import and export market of Britain, while it enabled them to engross much of the carrying trade to the exclusion of British ships. As it was difficult in the state of navigation at that time to make a voyage from the Mediterranean to the Baltic and back in one season, Bruges became the intermediate depot for the rich traffic with Italy and the Levant. Novgorod was the entrepot between the countries E. of Poland and the cities of the league; while Bergen secured to them the products of Scandinavia. The league was at its greatest power during the 14th and first half of the 15th century, but its objects were professedly different from those with which it set out, being now: 1, to protect the cities of the Hansa and their commerce from prejudice; 2, to guard and extend foreign commerce and to monopolize it; 3, to administer justice within the confederacy; 4, to prevent injustice, by means of assemblies, diets, and tribunals of arbitration; 5, to maintain the rights and immunities received from foreign princes, and, where possible, to extend them. Further, the league claimed to exercise a general judicial power, and to inflict the greater and lesser ban. In this change of principle may be traced the seeds of dissolution.

The association framed for defence had become a confederation exercising a sovereign power, aiming at monopoly, negotiating treaties, and declaring war or peace. In 1348 it fought and defeated the kings of Sweden and Norway, and Waldemar III. of Denmark. It subsequently deposed Magnus, king of Sweden, and gave his crown to his nephew Albert, duke of Mecklenburg. Again, in 1428, it declared war on Denmark and fitted out a fleet of 248 ships, carrying 12,000 troops. To such extent did it carry its arrogance that Niederhoff, a burgomaster of Dantzic, himself declared war against Christian I. of Denmark. When citizens of London, jealous of the privileges of the Hanse factory, insulted the employees of that institution, the league declared war against England, and compelled Edward IV. to grant yet more extravagant concessions. But influences were growing up which destroyed the league as rapidly as it rose. Its own efforts had abolished piracy, and left commerce safe on the ocean. Its own example, too, had taught states the value of the commerce they had hitherto disregarded. The league, in short, had laid the foundation of that commercial policy which has since become the basis of all political relations. Sovereigns, naturally jealous of a power whose military force rivalled their own, began by modifying their previous grants, and ended by repealing them. Such was the case with England, which about 1597 withdrew all privileges from the Hansard merchants. The English and Dutch, finding themselves now strong enough to compel the right to trade in the Baltic, entered into it with little care for the interests of the Hansards. Meantime the league, finding its monopolies slipping away, made desperate efforts to retain them; and the cost becoming heavy the maritime towns of the Baltic, so soon as direct trade was opened with the Dutch and English, seceded from the association. The discovery of America and of the passage to India *via* the cape of Good Hope turned the tide of commerce into new channels, and was the finishing blow to the existence of the league. Its last meeting was held in 1630 for the purpose of receiving the secession of the remaining members. Hamburg, Lübeck, and Bremen, to which was afterward added Frankfurt-on-the-Main, formed a new association under the name of the free Hanse towns. Napoleon in 1810 embodied them as a Hanseatic department of the French empire; their independence was acknowledged again in the act for the establishment of the German confederation (1815), and they obtained a joint vote in the federal diet as the free Hanseatic cities. Frankfurt was annexed to Prussia in 1866; the three other cities joined the North German confederation in the same year. Lübeck was subsequently added to the German customs union, while Hamburg and Bremen remained free ports. Each of these three cities now constitutes a state of the German empire, and is represented in the diet.—See Sartorius,

Geschichte des Ursprungs der deutschen Hansa (3 vols., Göttingen, 1802-'8), continued by Lappenberg (2 vols., Hamburg, 1830); Barthold, *Geschichte der deutschen Städte* (4 vols., Leipsic, 1850-'52); and Falke, *Die Hansa als deutsche See- und Handelsmacht* (Berlin, 1862).

HANSEN, Peter Andreas, a German astronomer, born in Tondern, Schleswig, Dec. 8, 1795, died in Gotha, March 28, 1874. He early excelled in astronomical studies, and in 1825 became director of the Seeberg observatory near Gotha. The new observatory in the suburb Erfurt of that town was built under his direction in 1859. He wrote a number of works on the problems of physical astronomy, including geodesy. His *Fundamenta nova Investigationis Orbitalis veræ, quam Luna perlustrat* (Gotha, 1838), formed the basis on which he subsequently calculated his celebrated *Tables de la lune* (London, 1857), for which the British government awarded him, on account of their practical value to navigators, a prize of £1,000. In explanation of the methods of calculation which he had employed in computing the perturbations of the moon, given in his tables, he published *Darlegung der theoretischen Berechnungen der in den Mondtafeln angewiesenen Störungen* (Leipsic, 1862-'4). Other works of importance are: *Berechnung der absoluten Störungen der Planeten* (Leipsic, 1856-'9); *Geodätische Untersuchungen* (1865-'8); *Tafeln der Egeria* (1868); and *Die kleinsten Quadrate in ihrer Anwendung auf die Geodäsie* (1868).

HANSON, a S. E. county of Dakota, recently formed, and not included in the census of 1870; area, 432 sq. m. It is intersected by the Dakota or James river. The surface is somewhat diversified, and the soil fertile.

HANSSENS, Charles Louis, a Belgian composer, born in Ghent in 1802, died April 12, 1871. He was a nephew of the composer Charles Louis Joseph Hanssens (1777-1852), and became connected with various theatres, and in 1855 professor at the Brussels conservatory of music. His best known opera, *Le siège de Calais*, was performed in Brussels in 1861, and he produced many ballets and other pieces.

HANSTEEN, Christopher, a Norwegian astronomer, born in Christiania, Sept. 26, 1784, died there in April, 1873. He studied at the university of Copenhagen, and in 1815 was appointed professor of astronomy and mathematics at Christiania. His *Magnetismus der Erde* (1819) recapitulated all the authentic facts on terrestrial magnetism, from the earliest times; and in his charts of the lines of equal dip, published soon after, he showed that there is but one true magnetic pole in each hemisphere. The results of his investigations of the effects of time and temperature in altering the magnetism of needles are published in his *De Mutationibus Virgæ Magneticæ* (1842). He made numerous observations in the north of Europe, and between 1828 and 1830 travelled in Siberia for the purpose of examining the region of con-

vergence of the needle. On his return he superintended the erection of an observatory in Christiania, of which he became director in 1833. He had charge of the triangulation of Norway, and was a member of the commission for the establishment of a scientific system of measures and weights, for which he furnished the fundamental principles. In a memoir on the secular change of the dip (Copenhagen, 1855; in French, Brussels, 1865), he argued that the annual diminution of the dip is decreasing, and consequently that a minimum of dip will occur in Europe before the close of this century. His most important works are *Resultate magnetischer Beobachtungen auf einer Reise nach Sibirien* (1863), and "Observations on Magnetic Inclination between the years 1855 and 1864" (Christiania, 1865; in French, Brussels, 1865).

HANTS, a central county of Nova Scotia, Canada, bounded N. W. by Minas basin, an inlet of the bay of Fundy, and N. E. by the Shubenacadie river; area, 1,176½ sq. m.; pop. in 1871, 21,301, of whom 8,589 were of English, 5,728 of Irish, and 5,051 of Scotch origin or descent. The surface is diversified with mountains and valleys. The underlying rock is the Permian sandstone of the coal measures, and gypsum is abundant. The Windsor and Annapolis railroad traverses it. Capital, Windsor.

HANWAY, Jonas, an English author, born in Portsmouth in 1712, died in London, Sept. 5, 1786. The earlier part of his life was passed in mercantile pursuits in St. Petersburg, during which he visited Persia, and published a "Historical Account of British Trade over the Caspian Sea, with a Journal of Travels," &c. (4 vols. 4to, London, 1753-'54). In 1756 he published a "Journal of Eight Days' Journey from Portsmouth to Kingston-upon-Thames;" to which is added an Essay upon Tea and its Pernicious Consequences;" which caused Dr. Johnson to remark that "Jonas acquired some reputation by travelling abroad, but lost it all by travelling at home." He wrote nearly 70 pamphlets, mostly devoted to philanthropic schemes. He was mainly instrumental in founding the London marine educational society, and the Magdalen society. He was the first man in England who ventured to brave public opinion by carrying an umbrella. There is a monument to him in Westminster abbey.

HAPSBURG (Ger. *Habsburg*; originally, it is supposed, *Habichtsburg* or Hawk's Castle), a ruined castle of Switzerland, near Brugg, canton of Aargau, on the Wülpselberg, on the right bank of the Aar. It was built early in the 11th century, and has given its name to the imperial house of Austria. The first count of Hapsburg was Werner II., a nephew of Werner, bishop of Strassburg, who is represented by genealogists as a descendant of Ethico I., a duke of Alemannia in the 7th century. The descendants of Count Werner augmented the possessions of their house until their acquisitions were divided by the brothers Albert IV.

and Rudolph III. in 1232. Rudolph became the founder of the Lauffenburg line, which again separated into the Hapsburg-Lauffenburg and Kyburg branches, of which the former became extinct (in its male line) in 1408, and the latter in 1415. The line of Albert IV., on the other hand, became flourishing through his son Rudolph, who in 1273 was elected emperor of Germany, and, having conquered Ottocar of Bohemia, gave his provinces, Austria, Styria, and Carniola, to his sons Albert, afterward the first German emperor of that name (died in 1308), and Rudolph, on whose death in 1290 his share also reverted to Albert. Under the grandsons of the latter the line again separated into two branches, one of which, numbering among its members the emperor Albert II. (died 1439), became extinct in 1457, with the death of his son Ladislas, king of Hungary, and the other ascended the throne of Germany in the person of Frederick III. (died 1493), whose descendants were now, after the acquisition of the Burgundian dominions, strong enough to make the German imperial dignity stationary and almost hereditary in their house down to the last hour of the German empire (1806). The successors of Frederick III. in that dignity were, of the male line, Maximilian I. (died 1519), Charles V. (abdicated 1556), Ferdinand I. (died 1564), Maximilian II. (1576), Rudolph II. (1612), Matthias (1619), Ferdinand II. (1637), Ferdinand III. (1657), Leopold I. (1705), Joseph I. (1711), and Charles VI. (1740); of the female line (Hapsburg-Lorraine), Francis I. of Lorraine, husband of Maria Theresa, daughter of Charles VI. (1765), Joseph II. (1790), Leopold II. (1792), and Francis II., who, having assumed the title of emperor of Austria in 1804 as Francis I., resigned the German imperial dignity in 1806. His successor in Austria was his son Ferdinand I. (1835-'48), after whose resignation his nephew Francis Joseph, son of the archduke Francis Charles, was declared emperor, Dec. 2, 1848. His son, Rudolph Francis Charles Joseph, born Aug. 21, 1858, is the heir to the crown. Through Charles V. (I.), who was the son of Philip, son of Maximilian I., and of Juana, daughter of Ferdinand and Isabella, the house of Hapsburg also ascended the throne of Spain, uniting with it the possessions of the house of Burgundy in the Low Countries; while his brother Ferdinand I. succeeded in attaching to the German line the crowns of his brother-in-law Louis II., king of Hungary and Bohemia, after the death of the latter in the battle of Mohács against the Turks (1526). The Spanish line was continued by Philip II., Philip III., Philip IV., and Charles II., with whom it became extinct in 1700, and was succeeded, after a great struggle involving half of Europe in war, by the Bourbons. The chief Swiss possessions of the house were lost as early as the first quarter of the 14th century, when the Swiss confederation was formed; the rest were ceded to various cantons at later periods, the

last as late as 1802.—One of the counts of Hapsburg, Geffery (Gottfried), settled in England in the 13th century, served Henry III. in his wars, and assumed the surname of Feilding from the county of Rinfilding (Rheinfelden) in Aargau, then belonging to Germany. He became the progenitor of the Denbigh family, and among the titles of the present earl of Denbigh are those of Viscount and Baron Feilding and count of Hapsburg-Laffenburg and Rheinfelden in Germany. Henry Fielding, the novelist, was a member of this family.

HARAFORAS, or *Alloera*, a savage people living in Celebes, the Molucca islands, and the interior of Papua. In general appearance they resemble the Malays, but are darker in color, with hair not straight like that of the Malays, nor woolly like that of the Papuans, but crisp. Their clothing is a strip of the inner bark of a tree, beaten with stones until it becomes white, and appears like rough white paper. Each warrior is armed with a *parang* or cleaver, which he carries in his right hand, while on his left arm he bears a shield 3 or 4 ft. long, but only 4 or 5 in. wide. The most remarkable characteristic of this people is their head-hunting. Every young man must cut off at least one human head before he can marry. The head of a child will do; that of a woman is better; a man's still better; while a white man's head is the most glorious trophy. In one of their villages were found three times as many skulls as the whole population. The Haraforas of Booro live not in villages, but scattered over their whole territory. Their houses consist of little more than a roof of palm leaves resting on four poles, with a kind of platform a foot or two above the ground, where they sit and sleep. Some of them acknowledge a Mohammedan rajah as their superior. It is said that they believe in one supreme being, who sent men a teacher, who left precepts of morality, taught the immortality of the soul, instituted circumcision, and finally ascended to heaven. Wallace thinks that the Haraforas are a distinct race from the Malays, and kindred to the Papuans, between whom and the Malays they form the boundary line. In Ceram they are the predominant type.

HARALSON, a N. W. county of Georgia, bordering on Alabama, and watered by the Tallapoosa river; area, about 325 sq. m.; pop. in 1870, 4,004, of whom 319 were colored. The surface is hilly or undulating. The chief productions in 1870 were 17,780 bushels of wheat, 86,352 of Indian corn, 7,209 of oats, 6,772 of sweet potatoes, 49,947 lbs. of butter, and 308 bales of cotton. There were 354 horses, 900 milk cows, 1,411 other cattle, 1,992 sheep, and 5,456 swine. Capital, Buchanan.

HARAR, *Hurrar*, or *Adari*, a small country, with an important town of the same name, in E. Africa, lat. 9° 20' N., lon. 42° 17' E., 165 m. S. S. W. of Zeylah on the gulf of Aden; pop. estimated at 8,000. The town is situated on a gentle slope about 5,500 ft. above the sea. On

the east are cultivated fields; the W. ridge is laid out in orchards; the N. side is covered with tombs; and on the south is a low valley traversed by a mountain torrent. It is surrounded by a wall of stone and mud, about 12 ft. high and 3 ft. thick, and kept in good repair. The wall has five gates flanked by oval towers, and encloses an area about a mile long and half a mile broad. The streets are narrow winding lanes, in many places nearly choked up with rubbish. The houses are generally built of rough stone cemented with clay, and whitewashed. The emir and the principal inhabitants have houses of two stories, with flat roofs, and openings high up for windows. These houses stand at the end of large courtyards, which are entered through gates of holcus stalks. There are numerous *gambisa*, bell-shaped thatched cottages, for the poorer classes. The principal buildings are mosques, the finest being the *jami*, or chief mosque, which was built by Turkish architects. The town is supplied with water from numerous springs in its vicinity. The inhabitants are a distinct race, and speak a dialect which is heard nowhere else. They are rigid Mohammedans, and enforce a law which forbids a white man to enter the town. The features of the men are coarse; many squint; others are disfigured by smallpox, scrofula, and other diseases. The women are nearly as ill-looking as the men. There is a proverb current in eastern Africa, "Hard as the heart of Harar." High and low indulge freely in intoxicating drinks. The principal occupation of the people is tilling the soil, which for several miles around is highly cultivated, producing coffee, wheat, jowari, barley, and a variety of fruits and vegetables. The *kaat*, a small plant of an intoxicating quality, is very abundant. Coffee is the most important article produced, and large quantities of it are annually exported. Other exports are slaves, ivory, tobacco, *wars* (safflower, or bastard saffron), tobes and woven cottons, holcus, wheat, *karanji* (a kind of bread), ghee, honey, gums, tallow, and mules. The hand-woven tobes form an important branch of native industry, and are considered equal to the celebrated cloths of Shoa. The tobe consists of a double length of eleven cubits by two in breadth, with a border of bright scarlet, and the average value of one in the city itself is about \$8. It is made of the long fine-stapled cotton which grows upon the hills, and is soft as silk, and warm enough for winter wear. The thread is spun by women with two wooden pins; the loom is worked by both sexes. The lances made in Harar are held in high estimation. Caravans arrive at all seasons. The principal are those which pass between Harar and Berbera and Zeylah, which may be considered as the ports of Harar. The March caravan is the largest, and usually consists of 2,000 camels. As of old, Harar is still the great half-way house for slaves from Zangaro, Gurague, and the Galla tribes. Harar is gov-

erned as an independent sovereignty by an emir, who rules despotically, and seeks to hide his Galla extraction by claiming descent from the caliph Abubekr. The only white man known to have visited the place is the English traveller Richard F. Burton, who penetrated thither in 1855, and who described it in his "First Footsteps in East Africa, or an Exploration of Harar" (London, 1856).

HARBAUGH, Henry, an American clergyman, born near Waynesborough, Pa., Oct. 28, 1817, died at Mercersburg, Pa., Dec. 28, 1867. In his youth he worked successively as a farmer, carpenter, miller, and teacher. In 1840 he entered Marshall college, Mercersburg, afterward studied theology, and in 1848 became pastor of a German Reformed church in Lewisburg, in 1850 in Lancaster, and in 1860 in Lebanon, Pa. In 1864 he was appointed professor of theology in the theological seminary of Mercersburg. He was known as an exponent of the so-called Mercersburg school of theology. In 1850 he originated the "Guardian," a monthly magazine, which he continued to edit till the end of 1866, when he became editor of the "Mercersburg Review." His principal works are: "Heaven, or an Earnest and Scriptural Inquiry into the Abode of the Sainted Dead" (1848); "The Heavenly Recognition" (1851); "The Heavenly Home" (1853); "The Birds of the Bible" (1854); "The Fathers of the German Reformed Church" (3 vols., 1857-'8); "The True Glory of Woman" (1858); "Plea for the Lord's Portion of a Christian's Wealth" (1858); "Poems" (1860); "Christological Theology" (1864); *Das alt Schulhaus*, a poem in the dialect of the Pennsylvania Germans; and *Harfe, Gedichte in Pennsylvanisch-Deutscher Mundart* (1870). Nearly all his works have passed through many editions.

HARBOR GRACE, a town and port of entry of Newfoundland, capital of a district of the same name, and the second town in population and importance in the colony, situated in the S. E. part of the island, on an inlet of the W. shore of Conception bay, 30 m. W. N. W. of St. John's; pop. in 1869, 6,770. It presents a handsome appearance from the harbor. The principal public building is the Roman Catholic cathedral, the dome of which is a prominent object upon entering the port; the interior is profusely decorated. The circuit court holds two sessions here annually, and a local court sits daily. The town contains several hotels, a grammar school and several elementary schools, a telegraph office, and a weekly newspaper. The harbor, which is about 5 m. in extent, is mostly exposed to the sea, but the portion where the wharves are built is sheltered by a beach, and is secure in all weathers. The cod and seal fisheries and commerce in their products are the principal business. The chief exports in 1872 were 72,508 quintals of cod-fish, 85,282 seal skins, 144,900 gallons of cod oil, 297,108 of seal oil, and 12,949 bbls. of herrings.

HARBURG, a town of Prussia, in the province of Hanover, on the Elbe, 6 m. S. of Hamburg; pop. in 1871, 16,506. It has glass works, sugar refineries, and manufactories of tobacco, sail cloth, and chemicals. The Elbe is now navigable for ocean vessels up to Harburg, and the rapid growth of the town is chiefly due to the development of its maritime trade. There is a newly built fort and large wharves. A railway connects the town with Hanover, and steamers ply between it and Hamburg.

HARCOURT, Sir William George Granville Vernon, an English lawyer, born Oct. 14, 1827. He graduated at Cambridge in 1851, was called to the bar in 1854, became queen's counsel in 1866, and professor of international law at Cambridge in 1869. In 1868 he was returned to parliament for the city of Oxford, and in November, 1873, became solicitor general and was knighted, going out of office with the Gladstone ministry in February, 1874. He has contributed to periodical literature, but as a writer is chiefly known by essays on the civil war in America and international law, published in the London "Times" under the signature of "Historicus."

HARDEE, William J., an American soldier, born in Savannah, Ga., in 1818, died at Wytheville, Va., Nov. 6, 1873. He graduated at West Point in 1838, served during the Florida war, and in the war with Mexico was brevetted lieutenant colonel for gallant and meritorious conduct. He was on frontier duty till 1856, when he became commandant of cadets and instructor in tactics at West Point, and in 1860 was appointed lieutenant colonel of cavalry. He resigned Jan. 31, 1861, and entered the confederate service as brigadier general. He took part in the battles of Shiloh, Perryville, Stone River, Chickamauga, and Chattanooga, commanded at Savannah and Charleston at the time of their occupation by the Union forces, and afterward surrendered in North Carolina, with the remainder of Johnston's army. He aided in compiling "Rifle and Light Infantry Tactics," mainly translated from the French by Lieut. Benet, which was adopted in 1855 for the use of the army and militia.

HARDEMAN. I. A N. W. county of Texas, separated from the Indian territory on the N. E. by the S. fork of Red river, and intersected by Pease river; area, 1,650 sq. m.; still unsettled. The surface is generally very broken, with high hills and narrow intervening valleys. The water, being impregnated with gypsum, is unpalatable. The county is better adapted for stock raising than for agriculture. **II.** A S. W. county of Tennessee, bordering on Mississippi, and traversed by Hatchie river; area, about 550 sq. m.; pop. in 1870, 18,074, of whom 6,854 were colored. It has a generally level surface and a fertile soil. The Hatchie river is navigable at high water from its mouth in the Mississippi to this county, which is crossed by the Mississippi Central and the Memphis and Charleston railroads. The chief productions in

1870 were 32,930 bushels of wheat, 586,508 of Indian corn, 19,799 of oats, 15,138 of Irish and 32,143 of sweet potatoes, 83,872 lbs. of butter, and 7,884 bales of cotton. There were 2,684 horses, 2,202 mules and asses, 3,146 milch cows, 7,298 other cattle, 7,139 sheep, and 34,936 swine. Capital, Bolivar.

HARDENBERG, Friedrich von, baron, better known under his *nom de plume* of NOVALIS, a German author, born at his family estate of Wiederstedt, Saxony, May 2, 1772, died there, March 25, 1801. He was educated at the gymnasium of Eisleben, and at the universities of Jena, Leipsic, and Wittenberg. He studied philosophy and jurisprudence, and prepared himself for the practice of the law, but accepted an appointment as auditor in the salt works of Weissenfels, of which his father was director. His delicate and sensitive mind received a fatal shock from the death in 1797 of a young lady, Sophie von Kuhn, with whom he was in love. The moral beauty of his life, the spiritual penetration and suggestiveness of some of his writings, and his enthusiastic love for the chivalric periods of Christianity and history, made him the idol of his friends; and although his works are but few and fragmentary, he holds a position in German literature as one of the chief representatives of the romantic school. A full collection of his writings was prepared by Friedrich von Schlegel and Tieck, with a biography by Tieck, and published in Berlin in 1802 (5th ed., 1838). An English translation of his *Heinrich von Ofterdingen* appeared in Cambridge, Mass., in 1842.

HARDENBERG, Karl August von, prince, a German statesman, born at Essenroda, Hanover, May 31, 1750, died in Genoa, Nov. 26, 1822. He received a brilliant education, travelled extensively abroad, and on his return to Hanover in 1778 entered the civil service. Shortly afterward he was sent on a diplomatic mission to London. The discovery of an intrigue between his wife and an English prince caused him to leave Hanover after having separated from her, and to enter the service of the duke of Brunswick. In 1786 he was deputed to deliver the will of Frederick the Great, which had been deposited with the duke, to his successor, Frederick William II. At that sovereign's recommendation he became in 1790 minister of the margrave of Anspach and Baireuth, at the time when the French actress Clairon, who had ruled the margrave and his people for 17 years, was supplanted in his affections by Lady Craven, who, however, could only be won by marriage. In 1791 Hardenberg effected the arrangement by which the territory of the margrave was ceded to Prussia, in consideration of a large annuity, which enabled that prince to reside with Lady Craven in affluence in England, and Hardenberg was made minister of state and governor of the ceded provinces. After the breaking out of the war with France in 1792, the king appointed him administrator of the army, and in 1795, as an ambassador for

Prussia, he signed the treaty of peace at Basel. In 1797, on the accession of Frederick William III., he was intrusted with the direction of the affairs of Franconia. In 1804, after Bernadotte's invasion of Hanover, Hardenberg became prime minister for a short time. His bold rebuke of Napoleon's invasion of the German territory irritated the emperor; and when the victory of Ansterlitz and the treaty of Presburg, in December, 1805, had strengthened Napoleon's position, and humbled the power of Prussia, the king, through fear of war, sacrificed his minister, and Hangwitz was appointed in his stead. For a time Hardenberg continued in the ministry of foreign affairs, but Napoleon declared, July 4, 1807, that he would not conclude the peace of Tilsit unless Hardenberg was dismissed, and the latter withdrew accordingly, and passed some time in exile in Russia. Returning to Berlin in 1810, he became chancellor of state, and carried out with zeal the policy of reforms shortly before inaugurated by Stein. Permission was granted to citizens and agricultural laborers to acquire and possess real estate, and to the nobles to engage in industrial and commercial pursuits without prejudice to their dignity. The burdens which hitherto lay exclusively upon the humbler classes were removed, the estates of the clergy were appropriated for the liquidation of the public debts, new resources were developed for the replenishment of the exhausted treasury, the army was reorganized, a new and improved system of national education was introduced, and harmony was restored between king, nobles, and people by an equal distribution of taxes and privileges. Finally, serfdom was abolished. Hardenberg aided powerfully in rousing the enthusiasm of the Germans in 1813 against Napoleon, signed the treaty of peace in 1814 as the representative of Prussia, and in reward for his services was raised to the rank of prince (June 3), and presented with the rich domain of Neuhausen. He accompanied the allied sovereigns to London, attended the congress of Vienna, and took part in the treaties of Paris in 1815. In 1817 he organized the council of state, of which he became president, and was present on behalf of Prussia at the congresses of Troppau, Laybach, and Verona (1820-22). In the latter part of his administration he reformed the system of taxation, and regulated the national archives. He left memoirs of his times from 1801 to the peace of Tilsit, which were deposited in the national archives, not to be opened until 50 years after his death. The *Mémoires d'un homme d'état* (Paris, 1828; German, Leipsic, 1828), containing some of his despatches, has been erroneously ascribed to him; Alphonse de Beauchamp is supposed to be the author. His biography was published by Klose in Halle in 1851.

HARDERWYK, or **Harderwijk**, a town of the Netherlands, in the province of Gelderland, on the E. shore of the Zuyder Zee, 30 m. E.

of Amsterdam; pop. about 5,500. It was formerly one of the Hanse towns. It was taken by Charles V. in 1522, by the Dutch in 1572, and in 1672 occupied by the French, who burnt it on their departure in 1674. It is fortified toward the land, and is surrounded with pleasure gardens and arable and meadow land. The harbor was formerly used for fitting out vessels in the East India trade, but is now available only for fishing vessels. Seafaring, fishing, and herring smoking are the principal occupations.

HARDHACK. See SPIRÆA.

HARDHEAD. See MENHADEN.

HARDICANUTE, Hardacante, Hardecante, or Hardkunt, the last of the Danish dynasty of English kings, born about 1017, died in Lambeth, June 8, 1042. He was the son of Canute the Great by Emma, daughter of Richard I., duke of Normandy, and widow of the deposed Saxon king Ethelred II., and previous to the death of his father was made viceroy of Denmark. Upon the death of Canute he neglected to assert his right to the throne of England, and allowed his half brother Harold to obtain Mercia and Northumbria, while Emma governed Wessex as the vicegerent of her son. Emma was finally obliged to retire to Bruges, and Harold held the whole country under obedience, Hardicanute meanwhile remaining in Denmark. Urged by his mother to dispossess the usurper, he was about to sail to England for that purpose, when he was met by a deputation of English nobles, who informed him of the death of Harold, and offered him the crown. He reigned from 1040 to 1042, and died of apoplexy, by which he had suddenly been rendered speechless four days before at a marriage feast. He was a good-natured glutton, was never married, and was succeeded by his half brother Edward the Confessor.

HARDIN, the name of six counties in the United States. **I.** A S. E. county of Texas, bounded E. by Neches river, and watered by Pine Island bayou and Big Sandy river, all navigable streams; area, 1,832 sq. m.; pop. in 1870, 1,460, of whom 242 were colored. Most of the surface is timbered, only a small portion being under cultivation. The chief productions in 1870 were 26,385 bushels of Indian corn, 15,240 of sweet potatoes, 280 bales of cotton, 6 hogsheds of sugar, 5,235 gallons of molasses, and 5,320 lbs. of rice. There were 492 horses, 1,246 milch cows, 4,592 other cattle, 600 sheep, and 5,701 swine. Capital, Hardin. **II.** A S. W. county of Tennessee, bordering on Alabama and Mississippi, and intersected by the Tennessee river; area, 768 sq. m.; pop. in 1870, 11,768, of whom 1,447 were colored. The surface slopes on either hand toward the river, which is here navigable by steamboats. Iron ore and timber are abundant, and the soil is fertile in some parts. The chief productions in 1870 were 35,566 bushels of wheat, 484,721 of Indian corn, 15,151 of oats, 86,918 lbs. of butter, and 2,026 bales of cotton. There were

1,993 horses, 870 mules and asses, 2,670 milch cows, 1,883 working oxen, 4,094 other cattle, 8,044 sheep, and 21,235 swine; 5 tanneries, 5 currying establishments, 5 flour mills, 3 planing mills, and 8 saw mills. Capital, Savannah. **III.** A N. W. county of Kentucky, bounded N. E. by Salt river and Rolling fork, and watered by branches of Green river; area, about 500 sq. m.; pop. in 1870, 15,705, of whom 2,276 were colored. It has a hilly or undulating surface and a fertile soil. It is crossed by the Louisville and Nashville and the Elizabethtown and Paducah railroads. The chief productions in 1870 were 138,463 bushels of wheat, 566,830 of Indian corn, 114,127 of oats, 284,178 lbs. of tobacco, 30,149 of wool, 115,363 of butter, and 3,483 tons of hay. There were 4,693 horses, 3,108 milch cows, 4,547 other cattle, 14,758 sheep, and 35,853 swine; 4 carriage factories, 8 flour mills, and 5 saw mills. Capital, Elizabethtown. **IV.** A N. W. county of Ohio, intersected by the Scioto river; area, 476 sq. m.; pop. in 1870, 18,714. The surface is nearly level, and most of the soil is excellent. It is traversed by the Cincinnati, Sandusky, and Cleveland, the Pittsburgh, Fort Wayne, and Chicago, and the Cleveland, Columbus, Cincinnati, and Indianapolis railroads. The chief productions in 1870 were 250,817 bushels of wheat, 270,909 of Indian corn, 147,562 of oats, 33,717 of potatoes, 140,021 lbs. of wool, 277,668 of butter, and 20,665 tons of hay. There were 5,385 horses, 4,272 milch cows, 7,151 other cattle, 42,402 sheep, and 15,212 swine; 3 manufacturing of boots and shoes, 6 of carriages, 3 of cooperage, 5 of furniture, 4 of saddlery and harness, 6 of tin, copper, and sheet-iron ware, 4 tanneries, 4 flour mills, 2 planing mills, and 35 saw mills. Capital, Kenton. **V.** A S. E. county of Illinois, separated from Kentucky by the Ohio river; area, 260 sq. m.; pop. in 1870, 5,024. It has a high, broken surface, with a fertile soil, and abounds in lead and iron ores. The chief productions in 1870 were 32,319 bushels of wheat, 172,651 of Indian corn, 26,991 of oats, and 105,707 of potatoes. There were 1,201 horses, 1,057 milch cows, 2,393 other cattle, 3,390 sheep, and 8,072 swine. Capital, Elizabethtown. **VI.** A central county of Iowa, intersected by Iowa river; area, 576 sq. m.; pop. in 1870, 13,684. It is well timbered, has excellent prairie land, and contains coal, red sandstone, and fine white limestone. The Dubuque and Sioux City railroad and the Central railroad of Iowa intersect it. The chief productions in 1870 were 496,347 bushels of wheat, 640,510 of Indian corn, 250,139 of oats, 45,077 of potatoes, 256,357 lbs. of butter, and 18,185 tons of hay. There were 5,191 horses, 4,153 milch cows, 6,900 other cattle, 3,857 sheep, and 10,557 swine; 7 flour mills, and 1 woollen factory. Capital, Eldora.

HARDING, Chester, an American portrait painter, born in Conway, Mass., Sept. 1, 1792, died in Boston, April 1, 1866. His family, who were poor, removed to Caledonia, N. Y., when

he was 14 years old, and he was early thrown upon his own resources for support. He became in turn hired boy, peddler, agent, and chairmaker, and eventually a house painter in Pittsburgh, Pa. He worked at this occupation a year, when acquaintance with a travelling portrait painter led him to attempt art. Having succeeded in producing a crude portrait of his wife, he devoted himself enthusiastically to the profession. He painted several other portraits at Pittsburgh, and then went to Paris, Ky., where he finished 100 portraits in six months at \$25 each. After receiving slight instruction in Philadelphia, he established himself prosperously in St. Louis. In August, 1823, he went to London, and spent three years in studying and painting. He resided next in Boston, where he became very popular. In 1843 he went to England again, and afterward resided in Springfield, Mass., spending his winters frequently in St. Louis or in some of the southern cities. Among the distinguished persons who sat to him were Presidents Madison, Monroe, and J. Q. Adams, Chief Justice Marshall, Charles Carroll, William Wirt, Henry Clay, Daniel Webster, John C. Calhoun, Washington Allston, the dukes of Norfolk, Hamilton, and Sussex, Samuel Rogers, Sir Archibald Alison, Lord Aberdeen, and David Ricardo. His last work was a portrait of Gen. Sherman. He wrote "My Egotistography," which has been printed, but not published.

HARDINGE. I. Henry, viscount, an English soldier, born in Wrotham, Kent, March 30, 1785, died at Southport, near Tunbridge Wells, Sept. 24, 1856. He entered the army in 1798, became lieutenant in 1802, and captain in 1804. He served throughout the peninsular war, being part of the time on the staff of the commander-in-chief. From 1809 to 1813 he was deputy quartermaster general of the Portuguese army. He took part in several battles in the peninsula, and was twice wounded. On the renewal of hostilities in 1815 he was again on the staff of Wellington. At the battle of Ligny, where he acted as brigadier general with the Prussian army, he lost his left arm, which prevented his presence at Waterloo. On his return to England he received a pension, and was made a knight commander of the bath. He was returned to parliament for Durham in 1820, and again in 1826. In 1828, when Wellington came into power, he was made secretary at war, which office he exchanged for the chief secretaryship for Ireland two years later. When Wellington went out Hardinge resigned, but was reinstated in office by Sir Robert Peel during his first term of power (1834-'5), and again in 1841. In April, 1844, he was appointed governor general of India. He originated the policy which ended in the annexation of Oude under his successor Lord Dalhousie. When the Sikhs invaded the British territory from Lahore, he collected a force of 32,000 men and 68 guns, and marched with it toward the threatened portion of the territory. On Dec.

13, 1845, learning that a large Sikh army had crossed the Sutlej, he issued a proclamation, and followed it up by immediately attacking the invaders. The battles of Moodkee, Ferozeshah, Sobraon, and Aliwal closed this short campaign of about six weeks, during which Hardinge served as a volunteer under Sir Hugh Gough. For his services he received the thanks of parliament and a pension of £3,000 a year, and was raised to the peerage with the title of Viscount Hardinge of Lahore; the East India company also gave him a pension of £5,000. He received 16 medals for service in as many pitched battles. In January, 1848, he was superseded in the Indian government by Lord Dalhousie. In February, 1852, he was appointed master of ordnance, and on the death of the duke of Wellington, in September of the same year, he became commander-in-chief of the forces. In October, 1855, he was advanced to the rank of field marshal. Having become paralytic, he resigned in July, 1856.

H. Charles Stewart, viscount, son of the preceding, born Sept. 12, 1822. He was educated at Eton and Christchurch, Oxford, was his father's secretary in India, and took part in the battles with the Sikhs. From 1851 to 1856 he sat in parliament for Downpatrick. Under Lord Derby's second administration (1858-'9) he was under secretary at war. He is an artist of much merit, and has published elaborate "Views in India" (imp. fol., 1847).

HARDOUIN, Jean, a French Jesuit, born in Quimper, Brittany, in 1646, died in Paris, Sept. 3, 1729. He entered the order of Jesuits, and after teaching rhetoric for some time, went to Paris to finish his classical studies. He prepared Pliny's "Natural History" for the Delphin series of classics (5 vols. 4to, 1685); and in his *Chronologia ex Nummis Antiquis restituta* (2 parts, 1693 and 1697) he maintained that of all the ancient classics none are genuine but Homer, Herodotus, Cicero, Pliny the Elder, the Georgics of Virgil, and the satires and epistles of Horace; and that with the aid of these the monks of the 13th century had fabricated all the others, and reconstructed ancient history. The *Æneid* he regarded as an allegory of the progress of Christianity. His work was suppressed by order of parliament, but was surreptitiously reprinted. In 1708 he was compelled to recant his opinions, but he reproduced them in subsequent works. In 1715 he published his great *Conciliorum Collectio* (12 vols. fol.), embracing the councils held from the year 34 to 1714, including more than 20 whose acts had not before been published; but Père Hardouin is accused of having suppressed some important pieces and replaced them by apocryphal passages. At the request of six doctors of the Sorbonne the parliament arrested the sale of the work, and caused a number of leaves to be cancelled. Among his other works are *Nummi Antiqui Populorum et Urbium* (1684); *De Nummis Antiquis Coloniarum et Municipiorum* (1689); *De Nummis Samaritanis*, and

De Nummis Herodianum (1691); *Chronologia Veteris Testamenti* (1697); *Opera Selecta* (1709); and his posthumous *Opera Varia* (1733).

HARDWICK, Charles, an English theologian, born at Slingsby, Yorkshire, Sept. 22, 1821, died Aug. 18, 1859, while ascending the Pyrenees near Bagnères de Luchon. He was a fellow of St. Catharine's hall, Cambridge, where he resided and held the office of Christian advocate in the university. In 1853 he was appointed professor of theology in Queen's college, Birmingham; in 1855, divinity lecturer at Cambridge; and a few months before his death, archdeacon of Ely. Among his works are: "Historical Inquiry relative to St. Catharine of Alexandria" (1849); "History of the Articles on Religion" (1851); "Twenty Sermons for Town Congregations" (1853); "History of the Christian Church during the Middle Ages" (1853); "History of the Christian Church during the Reformation" (1856); "History of the Preston Strikes and Lock-outs" (1857); and "Manual for Patrons of Friendly Societies" (1859). He commenced an elaborate work, "Christ and other Masters," comparing Christianity with other forms of religion, of which four parts were published (1855-'7; 2d ed., 1863). He also prepared an edition of the Anglo-Saxon and Northumbrian version of the Gospel of St. Matthew.

HARDWICKE, Earls of. I. Philip Yorke, first earl, an English jurist, born in Dover, Dec. 1, 1690, died in London, March 6, 1764. His grandfather, Simon Yorke, was a wealthy merchant of Dover, where his father, Philip, became a solicitor. He was educated for the law, and while a student at the Middle Temple became acquainted with Chief Justice Parker (afterward earl of Macclesfield), who employed him as companion and tutor to his sons, and used his influence to push him forward in his profession. He was called to the bar in 1715, and when his patron was made lord chancellor he entered parliament in 1719 as member for Lewes, the expenses of his election being defrayed by the government. The next year he was appointed solicitor general; soon afterward he was knighted; in 1724 he became attorney general, in 1733 lord chief justice of the king's bench and Baron Hardwicke of Hardwicke, and in 1737 lord chancellor. During the whole period of his public life he enjoyed the highest reputation for integrity and wisdom. Only three of his chancery judgments were appealed from, and those were confirmed. During the king's absence in 1740, '48, and '52, he was one of the justices chosen to administer the government; and in 1746 he was named lord high steward of England to preside at the trial of the rebel Scottish lords, Kilmarnock, Cromartie, Balmerino, and Lovat. In 1754 he was created Viscount Royston and earl of Hardwicke. In November, 1756, he resigned the great seal and passed the rest of his life in retirement. His life, with selections from his correspon-

dence, speeches, and judgments, was published in 1847. **II. Philip Yorke**, second earl, son of the preceding, born Dec. 9, 1720, died May 16, 1796. In 1741 he was returned to parliament for Reigate, and in 1747, 1754, and 1761 for the university of Cambridge, and was in 1762 made chancellor of the university. He was one of the writers of the "Athenian Letters, or the Epistolary Correspondence of an Agent of the King of Persia residing at Athens during the Peloponnesian War" (4 vols. 8vo, 1741-'3; 4to, 1781; 2 vols. 8vo, 1789; 2 vols. 4to, 1798 and 1810; besides which, several spurious editions were published). He edited the "Correspondence of Sir Dudley Carleton" (1775), and "Miscellaneous State Papers, from 1601 to 1726" (2 vols. 4to, 1798), and wrote a "Letter on the Subject of Ministerial Negotiation" (1785). **III. Philip Yorke**, third earl, nephew of the preceding, born May 27, 1757, died Nov. 18, 1834. He was lord lieutenant of Ireland from 1801 to 1806. Of his three sons, two died in infancy, and the other was lost in a storm off Lübeck, April 1, 1808. **IV. Charles Philip Yorke**, fourth earl, nephew of the preceding, born April 2, 1800, died Sept. 17, 1873. He entered the navy in 1815, and in 1816 served as midshipman under Lord Exmouth at the bombardment of Algiers. From 1831 to 1834 he was a member of the house of commons, and from 1841 to 1847 lord in waiting to the queen. During the revolutionary period of 1848 and 1849 he commanded the frigate Vengeance at Genoa, and in the latter year contributed toward preserving that city, then in revolt, for Victor Emanuel; and in 1863 he was made an admiral. In the mean time he distinguished himself as a member of the house of lords, and in 1852, and again in 1858, was lord privy seal under Lord Derby.

HARDY, a N. E. county of West Virginia, bordering on Virginia, drained by Cacapon river and the S. branch of the Potomac; area, about 800 sq. m.; pop. in 1870, 5,518, of whom 616 were colored. It has a mountainous, rocky surface, being crossed by ridges of the Alleghanies, and contains valuable mines of iron ore and many fertile valleys. The chief productions in 1870 were 33,442 bushels of wheat, 114,567 of Indian corn, 13,283 of oats, 13,566 lbs. of wool, 39,057 of butter, and 2,651 tons of hay. There were 1,163 horses, 1,360 milch cows, 4,674 other cattle, 4,176 sheep, and 2,967 swine. Capital, Moorefield.

HARE, the name of the small rodents of the family *leporida*, and the genus *lepus* (Linn.), which includes also the rabbits. This has fewer species than most other families of rodents, and presents the exceptional characters of large openings of the skull, an imperfect condition of the palate, the nasal process of the superior maxillary perforated, large orbits meeting in the middle line of the cranium, small temporal fossæ, and an increased number of incisor and molar teeth; the scapular spine has a long acromion process, sending down a considerable

branch at right angles; there are five toes on the fore feet and four on the hind; the ears are very large, as long as or longer than the head; the tail short and bushy, either rudimentary or carried erect; hind legs much longer than the anterior, and formed for leaping; the stomach is simple, or partially divided internally, and the cæcum very long and divided into numerous cells by tendinous bands; a part of the inner surface of the cheeks is clothed with small hairs. Hares are found in all parts of the world except Australia, but most abundantly in North America, and are chiefly confined to the northern hemisphere, extending even into the polar regions. There are only two genera of the family, *Lepus* and *lagomys*; the latter will be described under PIKA. The genus *Lepus* has the following dental formula: incisors $\frac{1}{1}$, and molars $\frac{2}{2}$, a larger number than in other rodents; two small incisors are placed behind the principal pair, which are grooved in front, all being white, and not implanted as deeply as



European Hare (*Lepus timidus*).

usual in the alveoli; the molars are rootless. There seems no osteological difference between hares and rabbits; the latter, however, are gregarious and make burrows in which the young are raised, while the former are more or less solitary, and merely make "forms" of grass on which they sit; rabbits are born blind and naked, but hares are said to have the eyes open and the body covered with hair at birth. The distinction being based chiefly on habits, there are hardly any species in America like the rabbit of Europe (*L. cuniculus*, Linn.), unless they be the gray rabbit (*L. sylvaticus*, Bach.) and the jackass rabbit (*L. collotis*, Wagler); and it is not certain that any other old world *Lepus* has the habits and peculiarities of *L. cuniculus*. The last three species will be noticed under RABBIT. The common hare of Europe (*L. timidus*, Linn.) has ears longer than the head, fringed anteriorly with long hair; the fur mottled with black and ochrey brown, with rufous tints on the neck and outer side of limbs; the abdomen, inner side of

limbs, and tail white; upper surface of tail and ears black; length from tip of nose to root of tail, along the curve of the back, 23 in.; weight, 8 to 12 lbs. Black and white varieties sometimes occur, but the color is not changed in winter as in the varying northern hares. This species is found generally throughout Europe, except in the coldest parts. The timidity of the hare is proverbial, and its speed has made it a favorite object of the chase from the times of the Romans; the principal use of the greyhound is to pursue this animal. The eyes are lateral and prominent, and vision extends to objects on all sides at once; a very acute sense of hearing and smell and great speed are given for further protection against its numerous enemies; the palms of the feet are covered with hair; the nostrils are circular, almost hidden by a fold which may be closed; the upper lip is cleft; the opening of the ears can also be closed; the mammae are 10. They are able to reproduce at a year old; the period of gestation is 30 days, and from two to five are produced at a birth. They remain quiet during the day in their form or seat, which is a mere depression in the ground near some bush, coming out toward evening in search of food; the color so much resembles that of the objects among which they rest, that, as if conscious of the resemblance, they will generally remain quiet in their form until they are almost trodden upon. This species readily takes to the water, and swims well; it sits upon its tarsi, and uses its fore paws in holding food and cleansing its fur, though, from its incomplete clavicles, less perfectly than in the clavicated rodents; it drinks lapping, and can bite severely. Early in spring the sexual appetite is very strong, and the animal acts so strangely that to be "as mad as a March hare" has become a proverb. Its intelligence is small, but its instincts in avoiding its enemies are remarkable. The hare and rabbit were ranked among ruminating animals by the Mosaic law, but were forbidden to the Jews because the hoofs were not divided; Moses probably called the hare a ruminant from the partial division of the stomach, and the evident lateral movement of the lower jaw. The food of the hare is entirely vegetable, and its flesh is delicate, nutritious, and universally esteemed.—The varying hare (*L. variabilis*, Pall.) is smaller than the common species, with smaller and less black ears, shorter tail, and without the mottled appearance and white mark on the cheek of the latter; in summer the general color is rusty brown, finely pencilled with black and rufous yellow above, and impure white below; tail white, grayish above. In winter the fur is white, with ears black-tipped, the change of color being due to the cold of the season in the northern regions which it inhabits. It is found in northern Europe and Asia as far as the arctic ocean, but is wanting in central Europe except in Alpine regions. Twenty other species of hare are described by Waterhouse in

Europe, Asia, and Africa.—Among the American species which grow white in the winter is the polar hare (*L. glacialis*, Leach), the largest of the family, exceeding a large cat; it measures about 2 ft. to the root of the tail, the latter being about $3\frac{1}{2}$ in., and the ears about 4 in. The color in winter is pure white, with the ears black-tipped before and behind, and the soles dirty yellowish white; in summer it is light brownish gray above, varied with black, rump and upper surface of tail dark plumbeous, ears glossy black with whitish posterior margin, and below whitish with a sooty tinge; the head is arched and wide, the ears broad, the tail short and hardly perceptible amid the dense hair; the fur is soft, fine, and full. This much resembles the European *L. variabilis*, and is distinguished chiefly by greater blackness of the ears; it is found in arctic America, and as far south as Newfoundland, in the most desolate and sterile regions; it feeds on berries bark, twigs, and evergreen leaves; it is not very shy, though difficult to take in its favorite snowy localities; its range probably extends from Greenland to Behring strait. Indians, trappers, and arctic travellers have often been saved from starvation by this animal. Its eyes are adapted for the twilight and auroral light of the polar countries, which, with the brightness of the pure snow, are always sufficient for its needs; its flesh is said to be delicious. From the shortness of the arctic summer this species produces young but once a year, from three to six at a birth; the fur is softer than the finest wool; its summer pelage does not last more than three or four months. The weight, in good condition, is from 10 to 14 lbs.—The northern hare, sometimes called white rabbit (*L. Americanus*, Erxl.), is a little smaller than the last; the color in winter is whitish, but the hairs at the root are gray and



Northern Hare (*Lepus Americanus*).

pale yellow in the middle; in summer the general hue is reddish brown, pencilled with black above, and the under parts white, very much like that of the European hare. It is found in the eastern portions of America from Virginia as far north as lat. 68°; its favorite haunts

are thick woods, where it is hunted with difficulty by dogs; its food consists of grasses, bark, leaves, young twigs, buds, and berries, and, in a domesticated state, of vegetables and fruits. This is the swiftest of the American species, and has been known to clear 21 ft. at a single leap; like other hares and rabbits, it is in the habit of beating the ground with the tarsi, when alarmed or enraged; it is fond of pursuing a beaten path in the woods, and is often snared in such places. Its flesh is not much esteemed. Its enemies, besides man and dogs, are the lynx and other carnivorous mammals, hawks, owls, and even the domestic cat. It is more fierce than the rabbit, and will bite and scratch severely. The skin is very tender, and the fur little valued by furriers; the hind feet are used by the latter in finishing his fabrics.—The swamp hare (*L. aquaticus*, Bach.) is as large as the northern species, with long ears and tail; dark grayish brown above and white below; it is strong and swift; the fur is coarse and glossy; the feet are not densely clothed with hair, but the toes are slender, with small pads, pointed, and with visible claws. This species prefers low marshy places, in the vicinity of water, to which it is fond of resorting; it is an excellent swimmer, subsisting chiefly on the roots of the iris and other aquatic plants; when started, it suddenly leaps from its form, and makes for the nearest water, seemingly conscious that in that element all traces of its scent will be soon lost; it is fond of hiding beneath the roots of trees overhanging the water, in hollows under river banks, and in decayed trees. It is most abundant in the swampy tracts bordering on the Mississippi and its tributaries in the southwestern states; it has not been seen E. or N. of Alabama, according to Bachman.—The marsh hare (*L. palustris*, Bach.) is smaller than the rabbit, with short ears and tail; the legs are short and the feet are thinly clothed with hair; the general color above is yellowish brown, beneath gray; the eyes are remarkably small. It is found in the maritime districts of the southern states, especially in the neighborhood of rice fields. It is an excellent swimmer, and is perfectly at home in the miry pool and boggy swamp; it runs low on the ground, and is rather slow and clumsy in its motions. Its flesh is considered superior to that of the gray rabbit. Like other species of the genus, it is infested in the summer and autumn with the larvæ of an *æstrus*, which penetrate the flesh and keep the animal lean from constant irritation. Its food consists principally of roots, bulbs, and twigs of plants growing in marshes. It breeds several times a year, having from five to seven at a birth; the young are placed in a kind of nest, made of rushes and lined with hair.—Several other species of hare are described by Waterhouse and Baird.

HARE. I. **Julius Charles**, an English clergyman, born at Herstmonceaux, Sussex, in 1796, died there, Jan. 23, 1855. He was a son of

the Rev. Robert Hare, rector of Herstmonceaux, and grandson of Bishop Francis Hare. After passing some time on the continent, he studied at the Charterhouse school, and was removed in 1812 to Trinity college, Cambridge, where he remained, with a brief interval, for 20 years; he became a fellow in 1818, and assistant tutor in 1822. During this period he applied himself especially to classical and philological learning, German literature, and the writings of Coleridge and Wordsworth. In 1827 appeared the first series of "Guesses at Truth, by Two Brothers," a volume of miscellaneous apophthegms and reflections, the joint production of himself and his elder brother, Augustus William. A second edition appeared in 1838 with additions by himself, and from the posthumous papers of his brother; a second series was published in 1848, and several editions have since been issued. At Cambridge he united with Thirlwall in translating the first two volumes of the second edition of Niebuhr's "History of Rome" (1828-'32), and he published in 1829 a vindication of the work from the charges of the "Quarterly Review." He also contributed largely to the "Philological Museum." He became rector of Herstmonceaux in 1832, archdeacon of Lewes in 1840, prebendary of Chichester in 1851, and chaplain to the queen in 1853. Soon after settling at Herstmonceaux he married the sister of his friend the Rev. F. D. Maurice, and began his intimacy with Bunsen, who dedicated to him the first volume of "Hippolytus and his Age." His collected works would form a commentary on the leading events of a quarter of a century having special reference to the church of England. Besides several volumes of sermons and miscellaneous pamphlets on church questions, his principal later publications were: "The Means of Unity, a Charge, with Notes" (1847); "The Duty of the Church in Times of Trial" (1848); "The True Remedy for the Evils of the Age" (1850); "A Letter to the Hon. R. Cavendish, on the recent Judgment of the Court of Appeal as affecting the Doctrine of the Church" (1850); "The Contest with Rome" (1852); "A Vindication of Luther against some of his recent English Assailants" (1854); and an edition of the "Essays and Tales of John Sterling, with a Memoir" (2 vols., 1848). **II. Augustus William**, brother of the preceding, born at Herstmonceaux in 1793, died in Rome, Feb. 18, 1834. He was a fellow of New college, Oxford, and became rector of Alton Barnes in 1829. He was associate author of the first series of "Guesses at Truth," and published "Sermons to a Country Congregation" (2 vols., London, 1837). **III. Augustus Julius Charles**, nephew of the preceding, born in Rome, March 13, 1834. He has published "Epitaphs for Country Churchyards" (1856); "Winter at Mentone" (1862); "Walks in Rome" (1871); "Wanderings in Spain" (1873); and "Memorials of a Quiet Life" (1872), which are records of the Hare family.

HARE, Robert, an American physicist, born in Philadelphia, Jan. 17, 1781, died there, May 15, 1858. His father, an English emigrant, settled in Philadelphia, and established there an extensive brewery, and his son in early life managed the business. His tastes, however, led him to scientific pursuits. He attended the courses of lectures on chemistry and physical sciences, and before he was 20 years of age joined the chemical society of Philadelphia, to which in 1801 he communicated a description of his important scientific invention, the oxyhydrogen blowpipe, which he then called the hydrostatic blowpipe, and which was afterward named by Prof. Silliman the compound blowpipe. (See BLOWPIPE.) At this period the subject of combustion was very imperfectly understood, and even Lavoisier, who had discovered that heat sufficiently intense to fuse alumina might be obtained by directing a jet of oxygen upon charcoal, and who had burned the elements of water together to produce this fluid, failed to discover that by this union of hydrogen and oxygen in combustion the most intense degree of heat known might be obtained. By means of this apparatus Hare was the first to render lime, magnesia, iridium, and platinum fusible in any considerable quantity. In addition to these discoveries he first announced that steam is not condensable when combined in equal parts with the vapor of carbon. In 1818 he was appointed professor of chemistry in the medical school of the university of Pennsylvania, and continued in this office till his resignation in 1847. His course of instruction was marked by the originality of his experiments and of the apparatus he employed. His instruments, often designed and sometimes made by himself, were always of large dimensions and of the most perfect plans; no expense nor personal labor being spared to render every piece of apparatus as complete as possible. The great collection which he accumulated he bestowed, after resigning his office in the university, upon the Smithsonian institution. One of the most useful small instruments of his invention is the valve cock or gallows screw, by means of which perfectly air-tight communication is made between cavities in separate pieces of apparatus. To his zeal and skill in devising and constructing improved forms of the voltaic pile, American chemists are indebted for the success they attained in applying the intense powers of extended series of voltaic couples long in advance of the general use of similar combinations in Europe. In 1816 he invented the calorimotor, a form of battery by which a large amount of heat is produced with little intensity. With the modified form of it called the deflagrator, devised in 1820, Prof. Silliman succeeded in 1823 in volatilizing and fusing carbon. The perfection of these forms of apparatus was acknowledged by Faraday, who adopted them in preference to any forms he could devise. It was with these batteries that

the first application of voltaic electricity to blasting under water was made. This was in 1831, and the experiments were made under the direction of Dr. Hare. (See **BLASTING**.) He contributed numerous papers to the "American Journal of Science," and other periodicals, and published "Brief View of the Policy and Resources of the United States" (1810), "Chemical Apparatus and Manipulations" (1836), and "Compendium of the Course of Chemical Instruction in the Medical Department of the University of Pennsylvania." In his later years he became a believer in spiritual manifestations, and wrote "Spiritualism Scientifically Demonstrated" (1855).

HAREBELL, the common name in this country and England for a beautiful wild perennial plant, *campanula rotundifolia*. The genus *campanula* is a large and very ornamental one; the flowers are bell-shaped, as is expressed by the name, which is the diminutive



Harebell (*Campanula rotundifolia*)

of the Italian *campana*, a bell. The specific name (round-leaved) was not happily chosen by Linnæus, as it is only the root leaves which are round; and as these usually decay by the time the plant flowers, the only leaves generally found upon it are those of the stem, which are linear or narrowly lanceolate. The stem is seldom a foot high, often half that, and bears from one to ten small bell-shaped flowers of the most beautiful bright blue color. The harebell is common in Europe and northern Asia, as well as in America, and is most frequent on shaded rocky banks, especially on mountains, which it ascends to great elevations. It is one of the wild flowers frequently alluded to in poetry, and one deserving of more attention from cultivators than it has received. It will grow in the ordinary soil of the borders, but its most appropriate place is upon the rock-work. There is a double-flowered variety in the French gardens; and an upright, rigid, wild

form has been described as a distinct species, *C. linifolia*. In England the flowers, treated with alum, are used to make a green dye.

HARE LIP, a congenital fissure of the upper lip, on one or on both sides, giving to the mouth very much the appearance presented by the cleft upper lip of the hare. It is sometimes accompanied by a fissure of the hard and soft palate in which the cavities of the mouth and nose communicate; when the teeth and the gums project through the fissure, the deformity is much increased. In the infant it interferes with the process of sucking, and in the adult renders speech imperfect; when fissure of the palate coexists, not only is articulation indistinct and nasal, but the passage of food and drink from the mouth to the nose, and of the nasal secretions into the mouth, is a source of great annoyance and mortification. This deformity is in most cases capable of removal by a very simple surgical operation, which has been practised successfully upon infants a few weeks old. The operation consists merely in paring the edges of the fissure with a knife or scissors, and keeping the cut surfaces in apposition by needles and sutures, strengthened by sticking plaster or collodion. When the hare lip is double, both sides are generally operated on at the same time. It is usual to extract projecting teeth, or to remove any too prominent portion of the jaw by cutting forceps. Bleeding is generally slight, and restrained by pressure or simple contact of the cut surfaces. In infants, adhesive straps are often necessary to prevent the edges being drawn asunder by crying or sucking; in adults, strict silence and liquid food are enjoined for four or five days. Fissure of the soft palate is remedied on the same principle of paring the edges and keeping them in contact by various kinds of sutures and needles; this operation, called *staphyloraphy*, can only be performed on a patient old enough to aid the proceedings of the surgeon. It is attributed to intra-uterine disease, producing an arrest of development; when single, it is said to be most common on the left side. In very rare instances it occurs upon the median line.

HAREM (Arabic, *el-harim*, the sanctuary), a term applied to the holy cities, Mecca and Medina, which are jointly called "the harems," and to the temple of Mecca, which is termed *mesjid el-harim*, the sacred mosque; but which in its more general use signifies throughout the Mohammedan world the females of a family, and more particularly that part of a dwelling house which is appropriated to their use. It is also commonly used by the Greeks, Armenians, and Jews of the Turkish empire, though the seclusion of their women is not so strict as that of the Mohammedans, and is founded on customs of remote antiquity in the East. Its prevalence among the Mohammedans has been established by the following passage of the Koran: "And speak unto the believing women, that they restrain their eyes,

and preserve their modesty, and discover not their ornaments, except what necessarily appeareth thereof; and let them throw their veils over their bosoms, and not show their ornaments, unless to their husbands, or their fathers, or their husbands' fathers, or their sons, or their husbands' sons, or their brothers, or their brothers' sons, or their sisters' sons, or their women, or unto such men as attend them and have no need of women [eunuchs], or unto children." The apartments of the women are generally in the upper stories, and so contrived as to secure the utmost privacy. They have commonly a separate entrance, and care is taken to place the windows so that they shall not be seen from the windows of any other house or from the street. In a harem containing several wives, it is usual to assign to them separate suites of apartments. In some places the harem is often superbly furnished and decorated, while the more public part of the dwelling exhibits every sign of poverty. The inmates of the harem consist of a wife or wives and of any number of female slaves, some of whom are kept merely as servants to cook, to clean the rooms, and to wait upon the wives and concubines. It is estimated, however, by the best informed travellers, that only one man in 20 has more than one wife. It is only the very rich that maintain populous harems, and many of these are content with one wife. In frequent instances the wife who will not tolerate a second spouse in the harem will permit the husband to keep concubines for the sake of having them to wait upon her. It is said that Mohammedan women do not dislike the seclusion in which they are kept, but take a pride in it as an evidence of their value. If the husband permits them to be freely seen by other men, they regard his liberality as indicative of indifference.—The Christian travellers most familiar with oriental life have passed very opposite judgments on the nature and effect of the harem system. Lady Mary Montagu, who visited the harems of the great officers of the Turkish empire, has left gorgeous pictures of what she saw. She describes the harems as glittering with splendor and inhabited by lovely girls magnificently attired, leading a gay and happy life. Harriet Martineau, who visited some harems of the higher class in Cairo and Damascus in 1847, gives a very different picture. In a harem at Cairo she found 20 women, some slaves, nearly all young, some good-looking, but none handsome. Some were black, Nubians or Abyssinians, and the rest Circassians with very light complexions. She saw no trace of intellect in these women, except in a homely old one. Their ignorance she describes as fearful, and their grossness as revolting. At Damascus she saw the seven wives of three men in one harem, with a crowd of attendants. Of the seven, two had been the wives of the head of the household, who was dead; three were the wives of his eldest son, aged 22; and the remaining two were the wives of his second son, aged 15. Of

the five younger, three were sisters, children of different mothers in the same harem. They smoked, drank coffee and sherbet, sang to the accompaniment of a tambourine, danced in an indecent manner, and all the while romping, kissing, and screaming went on among old and young. She pronounces them the most studiously depressed and corrupted women she ever saw. Lady Shiel, wife of the British minister to Persia in 1849, who lived four years in that country, says that Persian women of the upper class lead a life of idleness and luxury, and enjoy more liberty than the women of Christendom. They consume their time by going to the bath and by a constant round of visits, and frequently acquire a knowledge of reading and writing, and of the choice poetical works in their native language. Cooking, or at least its superintendence, is a favorite pastime. In populous harems the mortality among children is very great, owing to the neglect, laziness, and ignorance of the mothers and nurses. An American lady, Mrs. Caroline Paine, who travelled in the Turkish empire, says in her "Tent and Harem" (New York, 1859) that she made the acquaintance of Turkish women who were "wonderful instances of native elegance, refinement, and aptness in the courtesies, ordinary civilities, and prattle of society." She says: "Turkish women are by no means confined to a life of solitude or imprisonment, and they would be scarcely tempted to exchange the perfect freedom and exemption from the austere duties of life, which is their acme of happiness, for all the advantages that might be gained from intellectual pursuits or a different form of society." Capt. Burton, who travelled extensively in Mohammedan countries in the disguise of a native, and who in the character of a physician saw something of the interior of the harem, says that the oriental is "the only state of society in which jealousy and quarrels about the sex are the exception and not the rule of life." Since Abdul-Aziz succeeded to the throne of Turkey (1861), in some of the harems of Constantinople and other cities European ideas and manners have been engrafted upon Asiatic splendor, and the women, under attendance, now go into the streets and bazaars, covering the lower parts of their faces with a single white veil, so thin that it does not conceal the features, while the eyes and eyebrows are entirely exposed. The majority of the harems, however, in the cities and in the interior, still rigidly and religiously retain all the ancient rules and customs. The two ladies of W. H. Seward's party, in his tour around the world, in May, 1871, visited the harem in the palace of the khedive's mother (the princess *valideh*) at Cairo. After traversing a succession of saloons superbly furnished with velvet carpets, lace and damask curtains, satin-covered sofas and divans, large French mirrors, and crystal chandeliers, they were presented to the princess, who was surrounded by the ladies of the

harem and Circassian slave girls. The princess wife of the khedive wore a green silk dress with lace, hat, gloves, boots, and fan, all from London or Paris, and her light brown hair was dressed in the latest Parisian style. The ladies of the harem, many of them displaying diamond solitaires of immense size, confessed their partiality for European modes, and all of them had ordered outfits from London, with the request that they might be counterparts of the trousseau of the princess Louise. The princess mother said that "since the ladies of the harem were allowed to see the European opera and ballet at the theatre in Alexandria, they have become quite disgusted with the native performances of their own country." She explained the condition of the slave women; they were brought from their native land when quite young, were provided with husbands and dowries, and were "very lucky." But the system as a domestic institution is summed up by Mr. Seward as follows: "The Mohammedan provision for woman is a prison in which her sufferings from jealousy are consoled by the indulgence of her vanity. She is allowed the society of her own sex with far less restraint than is ordinarily supposed, and she displays before her visiting friends with pride the wealth and ornaments which lighten her chains." She goes abroad only in a carriage, and under strict surveillance; "she never reads, and, so far as possible, is required never to think."—The harem, under various regulations, is found in all eastern countries where polygamy and concubinage are permitted or practised. While the Japanese generally have but one wife, the princes and nobles keep as many concubines as they please, securing them in harems, but much less rigorously than is done in Mohammedan countries. At Hiogo, in October, 1870, Mr. Seward saw a gay Japanese yacht on board of which was a daimio surrounded by numerous retainers and a bevy of highly painted and elegantly dressed young women. The daimio was "giving his harem a picnic." In Siam the law allows but one wife, except to the king; concubinage, however, is limited only by the means of the man. Within the capital, Bangkok, stands enclosed in a double wall the city of the Nang Harm, or veiled women, which is fully described by Mrs. Leonowens in "The Romance of the Harem" (Boston, 1873): "In this city live none but women and children. Here the houses of the royal princesses, the wives, concubines, and relatives of the king, with their numerous slaves and personal attendants, form regular streets and avenues, with small parks, artificial lakes, and groups of fine trees scattered over miniature lawns and beautiful flower gardens. In the southern part of this strange city the mechanical slaves of the wives, concubines, and princesses live, and ply their trades for the profit of their mistresses." This woman's city has its own laws, and its female judges, guards, police, prison keep-

ers, executioners, merchants, brokers, teachers, and mechanics in every trade. No man can enter the city except the king and the priests, who may be admitted every morning under amazon guard. The slave women can go out to see their husbands, or on business for their mistresses; the mistresses can never leave it, except by the covered passages to the palaces, temples, and gardens, until age and position have given them a certain degree of freedom. No fewer than 9,000 women, it is asserted, are thus secluded, and the Nang Harm presents the most extensive and rigorous instance of the harem system.

HARFLEUR, a town of France, in the department of Seine-Inférieure, on the small river Lézarde, about 2 m. W. of the Seine, 4 m. N. E. of Havre, and 4 m. S. W. of Honfleur, with which it is occasionally confounded; pop. in 1866, 1,966. It was once a bulwark against foreign invasion and an important port, but deposits brought down by the Lézarde have spoiled the harbor by forming a fringe of land, gradually increasing the distance to the mouth of the Seine. The vicissitudes of war, the revocation of the edict of Nantes, and especially the rise of Havre, gave a final blow to Harfleur, and the fortifications have been demolished. It has one of the most renowned later Gothic churches of Normandy, with a famous belfry; a modern château with a beautiful park; and in the vicinity are delightful promenades. It continues also to have a considerable coasting trade, and possesses a number of manufactories. The fisheries are likewise prosperous.—Henry V. of England captured Harfleur in 1415, expelling many of the inhabitants, whom he replaced with English settlers. The English were driven from the town in 1433 by the neighboring people of the territory (*pagis*) of Caux, but the English subsequently reoccupied it for a number of years, their domination finally terminating in 1450. Vauban designed a canal to connect Harfleur with Havre, which remains unfinished.

HARFORD, a N. E. county of Maryland, bordering on Pennsylvania, bounded N. E. by the Susquehanna river, and S. E. by Chesapeake bay; area, 480 sq. m.; pop. in 1870, 22,605, of whom 4,855 were colored. The N. W. part is hilly, and contains limestone, granite, and iron. The surface near the bay is level. The soil is fertilized by the use of lime and guano. It is crossed by the Tide-Water canal and the Philadelphia, Wilmington, and Baltimore railroad. The chief productions in 1870 were 244,835 bushels of wheat, 659,789 of Indian corn, 303,164 of oats, 140,523 of potatoes, 209,140 lbs. of tobacco, and 16,927 tons of hay. There were 4,247 horses, 5,718 milch cows, 7,558 other cattle, 5,612 sheep, and 11,676 swine; 1 manufactory of drugs and chemicals, 1 of fertilizers, 1 of pig iron, 2 of lime, 2 saw mills, and 4 flour mills. Capital, Belair.

HARGRAVES, Edmund Hammond, the discoverer of the gold fields of Australia, born at Gos-

port, England, about 1816. At the age of 14 he went to sea on board a merchant ship, and during the succeeding three years visited almost every part of the world as a sailor. In 1834 he settled in Australia, where he married, and engaged in farming and stock raising. In 1849 he went to California, where he worked in the gold diggings, and was struck with the similarity between the geological structure of California and that of Australia. In January, 1851, he returned to Australia, and on Feb. 5 set out from Sydney on horseback to cross the Blue mountains and explore for gold on the Macquarie river and its tributaries. Having concluded his investigations, he wrote to the colonial secretary, April 30, 1851, naming various places in the district of Bathurst where gold might be found. Within the year following this disclosure gold was exported from New South Wales and Victoria to the amount of nearly \$20,000,000. Hargraves was appointed commissioner of crown lands; the legislative council of New South Wales voted him £10,000; a gold cup worth £500 was presented to him at a public dinner; and he received various other public and private rewards. In 1854 he returned to England, where he published a volume entitled "Australia and its Gold Fields" (8vo, London, 1855).

HÄRING, Wilhelm, better known under his *nom de plume* **WILIBALD ALEXIS**, a German novelist, born in Breslau, June 23, 1797, died at Arnstadt, Dec. 16, 1871. He served in the army as a volunteer, and studied jurisprudence. Having gained reputation by historical novels, he became especially known by writing a romance entitled *Walladmor*, in compliance with a wager to produce an imitation of Walter Scott's works. De Quincey undertook to translate this romance into English, but his version, though published with the title of "Walladmor" (London, 1824), was so much modified as to be nearly an original work. He wrote several books of travel, and was engaged in various branches of literature, but most successfully as a writer of historical novels. The best of them are: *Schloss Avalon* (Leipsic, 1827); *Cabanis* (6 vols., Berlin, 1832), containing a military song which was set to music and became very popular; *Der Roland von Berlin* (3 vols., Leipsic, 1840); *Der falsche Waldemar* (3 vols., Berlin, 1842); *Die Hosen des Herrn von Bredono* (2 vols., 1846-'8); *Ruhe ist die erste Bürgerpflicht* (5 vols., 1852); *Isegrimm* (1854); and *Dorothee* (1856). A complete edition of his works was published in Berlin in 1861-'6, in 18 vols. In concert with Hitzig he prepared 28 of the 36 volumes of *Der neue Pitaaval* (Leipsic, 1842-'65), a collection of historical sketches of criminal cases (new series by Vollert, 7 vols., 1866-'72).

HARINGTON, Sir John, an English poet, born at Kelston, near Bath, in 1561, died in London in 1612. His mother was an illegitimate daughter of Henry VIII., his father an officer of the court, and Queen Elizabeth was his god-

mother. He was educated at Eton and Cambridge. In 1591 he published a translation of Ariosto's "Orlando Furioso," which gained him considerable reputation. In 1599 he accompanied the earl of Essex to Ireland, and attended him also in his precipitate return to England. While he was in Ireland, Essex knighted him on the field, to the great displeasure of Elizabeth; but James I. made him a knight of the bath in 1603. He wrote a satiric poem called the "Metamorphosis of Ajax" (1596), after the manner of Rabelais, in which he embellished a trivial subject with a vast store of learning, wit, and humor. The author was refused a license to print it, and was punished for its publication by exclusion from the court. In the same year he published an "Apologie" for the "Metamorphosis." "The Englishman's Doctor, or the Schoole of Salerne," a poem, appeared in 1608 or 1609. A collection of his "Most Elegant and Wittie Epigrams" was appended to an edition of his "Orlando Furioso" in 1633; and a miscellany of original papers in prose and verse by Harington and others of his time, under the title of *Nugæ Antiquæ*, was published in 1769-'79. A new edition with a life of Harington was edited by Thomas Park (London, 1804).

HARIRI, Abu Mohammed Kasem ben Ali, an Arabian poet, born in Bassorah about 1050, died there in 1121 or 1122. The name Hariri, "dealer in silk," is believed to refer to the occupation of the poet or one of his ancestors. For a while he held a political office, having the title of *sahab al-khabar* (news officer). He had passed the age of 50 when Syria and a part of Mesopotamia were conquered by the Christians of the first crusade, and an incident of this expedition is said to have inspired him with the idea of writing the *Makamat* (plural of *makama*, resting place, assembly). A detachment of crusaders surprised the town of Seraj, pillaged and burned it, massacring the men and carrying away the women. Among the few who escaped was Abu Seid, who appeared in rags before Hariri and his friends, and made a deep impression upon the poet by the elegance of his recital. This man served as a model for the hero of the *Makamat*, who received his name, Abu Seid of Seraj, while the poet seems to have painted himself in the person of the narrator, Hareth ben Hammam. Abu Seid, who appears in the 50 tableaux or novelettes of the poem, is a scholar and poet, eager to enjoy life, careless of the restrictions of custom, and nowise ashamed of his poverty. The Arabs regard the *Makamat* as the great treasury of their language. Having consecrated his last *makama* to the glorification of his native city, and to the recollections of his youth, Hariri makes his Abu Seid, now grown old, vow repentance and devotion to the cares of eternity. He continued, however, to revise and correct his work till his death. He is also the author of numerous grammatical works, of which the *Molhat al-Irab* is a versified essay

on the syntax of the Arabian language. Of this, as well as of *Dorrat al-Gawas*, on idioms, fragments are contained in Sylvestre de Sacy's *Anthologie grammaticale arabe*. Single makamas of Hariri have been translated by Golius, Albert Schultens, Reiske, Rosenmüller, Jahn, Sylvestre de Sacy, Munk, Theodore Preston, and others. The work of the last mentioned translator, containing 20 makamas in English, appeared in London in 1850, and another collection by T. Chenery in 1867. A complete Latin translation was published by Peiper (2d ed., Leipsic, 1836). But neither of these equals the German translation of the *Makamat* by Friedrich Rückert, entitled *Die Verwandlungen des Abu Seid von Sarug, oder die Makamen des Hariri, in freien Nachbildungen* (2 vols., Stuttgart, 4th ed., 1864). One of the best editions of the original is that of Sylvestre de Sacy (2 vols., Paris, 1821-'2), with a commentary mostly collected from Arabian writers; others have been published at Calcutta (3 vols., 1809-14), at Cairo, with notes (1850), and by Reinand and Dernburg (Derembourg) at Paris (2 vols., 1847-'53). Partial editions with notes are numerous.

HARLAN. I. A S. E. county of Kentucky, bordering on Virginia, watered by Cumberland river and its head streams, and bounded S. E. by Cumberland mountain; area, about 600 sq. m.; pop. in 1870, 4,415, of whom 99 were colored. It has a rugged surface, and is rich in coal, iron, and timber. The chief productions in 1870 were 2,266 bushels of wheat, 158,410 of Indian corn, 12,207 of oats, 12,636 of potatoes, 10,324 lbs. of wool, and 58,558 of butter. There were 779 horses, 1,609 milch cows, 3,151 other cattle, 5,933 sheep, and 10,310 swine. Capital, Harlan. II. A S. county of Nebraska, bordering on Kansas, and intersected by Republican river and its branches; area, 576 sq. m. It is not included in the census of 1870. Capital, Melrose.

HARLAY, Achille de, a French jurist, born in Paris, March 7, 1536, died there in October, 1616. He belonged to an ancient family, and married a daughter of De Thou, whom he succeeded in 1582 as first president of the Paris parliament. His admirers called him the Christian Cato, on account of his virtues and piety, and he was equally distinguished by his devotion to the crown during one of the most stormy periods of French history. He published *La coutume d'Orléans* (Paris, 1583).

HARLEM. See HAARLEM.

HARLEQUIN (Ital. *arlecchino*; Fr. *arlequin*), a pantomimic character, transplanted from the Italian stage to other countries, traceable to the earliest times, and more immediately identified with the ancient Roman mimes, who appeared before the public with their heads shaved, a sooty face, unshod feet, and a coat of many colors. The general term *zany* (It. *zanni*), which includes most sorts of harlequins, is derived from the Latin *sannio*, a buffoon. Conspicuous among the characters or masks of the

Italian extemporized comedy were the ancient heroes of pantomime, the two *zanni*. One of them was converted into Harlequin, and the other into Scapino, both satirizing the roguery and drollery of the Bergamese, who were proverbial for their knavery, while other characters were introduced who parodied the Venetians, the Bolognese, and the rival inhabitants of other Italian cities. Harlequin generally figured as a servant of Pantalone, the comic representative of Venetian foibles, and as the lover of Colombina or the *arlecchinetta*; while Scapino was in the service of the *dottore*, the loquacious pedant and the burlesque type of the academical pretensions of Bologna. The principal inventor of the pantomimes in which the harlequin was introduced was Ruzzante, who flourished about 1530; and many of the actors who represented the harlequin were artists of distinction. Rich, in the 18th century, introduced Harlequin on the English stage, and performed the character under the feigned name of Lun. In France Harlequin was converted into a wit, and even into a moralist, and is the hero of Florian's compositions. The German Hanswurst was originally intended as a caricature of the Italian Harlequin, but corresponded more particularly with the Italian Maccaroni, the French Jean Potage, the English Jack Pudding, and the Dutch Pickelherring. The German Hanswurst was as noted for his clumsiness as the Italian Harlequin for his elasticity or the French for his wit, and the Spanish Gracioso for his drollery. Both Hanswurst and Harlequin were gourmands; but the difference between the German and Italian buffoon was, that the latter could eat a great deal without having a glutton-like appearance, while the former grew to Falstaffian dimensions. Gottsched in the middle of the 18th century drove the Hanswurst from the German stage, and the Harlequin of the Italian became under Goldoni's hand an entirely new character.

HARLESS, Gottlieb Christoph Adolf, a German theologian, born in Nuremberg, Nov. 21, 1806. He graduated in theology at Erlangen in 1829, and in 1836 was made ordinary professor of theology at the same university. As a deputy to the Bavarian diet in 1842-'3 he opposed the order which required all persons connected with the army to bow the knee to the sacramental host. The government consequently removed him from his professorship in March, 1845, but appointed him a councillor of the consistory at Baireuth. In the same year he was called to Leipsic as professor of theology, and in 1847 became also pastor of a church in that city. In 1850 he was appointed chief court preacher, councillor in the ministry of public worship, and vice president of the consistory at Dresden. In November, 1852, he was appointed president of the Protestant consistory at Munich and member of the Bavarian state council. Among his writings are: *Commentar über den Brief an die Epheser* (1834); *Die christliche Ethik* (1842); *Sonntagsweihe*, a

collection of sermons (2d ed., 4 vols., 1860); *Kirche und Amt nach lutherischer Lehre* (1853); *Das Verhältniss des Christenthums zu Cultur- und Lebensfragen der Gegenwart* (1863); and *Jakob Böhme und die Alchymisten* (1870).

HARLEY, Robert, earl of Oxford, a British statesman, born in London, Dec. 5, 1661, died May 21, 1724. He was of an old Puritan family of Herefordshire, his father and grandfather having taken arms on the parliamentary side in the civil war, although they subsequently favored the restoration. He made his first appearance in public life in 1688 as a supporter of the prince of Orange, in whose behalf he aided his father in raising a body of horse. He entered the first parliament which met after the revolution, and for a time acted with the most ultra section of the whigs. Subsequently, however, from being an intolerant and vindictive whig he became an equally intolerant high churchman and tory. He gained the confidence of both dissenters and churchmen, who combined in February, 1701, to elect him speaker of the house of commons. He was chosen to the same office in the two succeeding parliaments, but resigned it in 1704 upon being appointed secretary of state. His promotion was due, according to the account given by the duchess of Marlborough, to the exertions of Miss Abigail Hill, whom he subsequently assisted in becoming Mrs. Masham, and whose influence with Queen Anne was considerable. Godolphin, Marlborough, and the whigs lost no opportunity of weakening Harley's power, and in this were favored by the discovery that one of his clerks named Gregg was carrying on a secret correspondence with the French court. Although there was no evidence of the complicity of Harley in this matter, and Gregg signed a paper exculpating him, he became the object of so much popular odium that the queen was constrained in 1708 to dismiss him. In August, 1710, the whigs went out of office, and he was appointed chancellor of the exchequer. The attempt of a French abbé, Guiscard, to assassinate him in March, 1711, caused a popular reaction in his favor; and upon his recovery from his wounds, which were slight, he received the congratulations of both houses of parliament. In May he was created earl of Oxford and Mortimer and appointed lord high treasurer of Great Britain. He was now at the height of his power; the whole direction of affairs was in his hands; the Marlborough party was completely discomfited, while his own influence with the queen was constantly increasing; and to add to the éclat of his administration, the treaty of Utrecht was concluded in April, 1713. Soon after this the intrigues of Bolingbroke, his ministerial coadjutor and political associate, began to undermine his position; and on July 27, 1714, after a stormy session of the privy council, he received his dismissal. He was treated with marked coldness at court on the accession of George I., and in August, 1715, was impeached

by the house of commons for high treason and committed to the tower. He was attended thither by an immense multitude, crying, "High church and Oxford for ever!" After nearly two years' confinement he was brought to trial in June, 1717, on his own petition, and the house of commons not appearing to prosecute their impeachment, he was acquitted. The researches of Sir James Mackintosh among the Stuart papers prove that at this very time Harley was carrying on a treasonable correspondence with the pretender James at Versailles. He thenceforth lived in retirement. He left a library of books, pamphlets, and manuscripts of immense value. The manuscripts, amounting to nearly 8,000, and known as the Harleian collection, are now deposited in the British museum. This collection, as well as those of the books and pamphlets, the latter, it is said, numbering 400,000, was completed by Edward Harley, his son and successor. The books and pamphlets were sold to T. Osborne for less than the cost of binding, and Dr. Johnson, Oldys, and Maittaire made a catalogue of them in 5 vols. 8vo (1743-'5). From them was compiled "The Harleian Miscellany" of rare pamphlets, tracts, &c., with annotations by William Oldys (8 vols. 4to, 1744-'6; enlarged, 13 vols. 4to, 1808). Harley's own writings, consisting of a "Letter to Swift on Correcting and Improving the English Tongue," an "Essay on Public Credit," an "Essay on Loans," a "Vindication of the Rights of the Commons of England," and other miscellaneous pamphlets, have little merit. A few days before his dismissal, he wrote, in a letter to the queen, an account of his own administration, which is published in Tindal's history and elsewhere. He was the intimate friend of Pope, Swift, Arbuthnot, Parnell, Prior, and Gay, and aspired himself to the character of a wit and poet, sending to his friends verses which, Macaulay says, were "more execrable than the bellman's." Notwithstanding the important official stations he occupied, and his intimate relations with literary men, he was naturally slow of intellect, an awkward speaker, and possessed, according to Macaulay, "that sort of industry and that sort of exactness which would have made him a respectable antiquary or king-at-arms." According to the same authority, his influence in parliament was altogether out of proportion to his abilities; and his erudition, his gravity, his avoidance of show, and a certain affectation of mystery and reserve which he could assume on occasions, must account for the position he occupied during his long career.

HARLINGEN, a fortified seaport town of the Netherlands, in the province of Friesland, on the North sea, 16 m. W. by S. of Leenwarden, with which it is connected by a canal, and 60 m. N. N. E. of Amsterdam; pop. about 10,000. It has an active trade with England, Norway, and the Baltic, being the principal commercial town of Friesland, and manufactures sail cloth,

gin, bricks, paper, salt, &c. The principal exports are cattle, butter, cheese, fruit, vegetables, flax, hemp, and wool; the chief imports are corn, timber, tar, pitch, coal, chalk, and earthenware. It occupies a site where in 1134 a whole town was destroyed by an inundation of the sea. It is protected by one of the largest dikes in Holland, and contains a monument to the Spanish governor Robles, who first introduced an improved method of constructing these sea walls.

HARLOW, George Henry, an English painter, born in London, June 10, 1787, died there, Feb. 4, 1819. He studied under Sir Thomas Lawrence, who used to employ him to prepare pictures in the dead coloring and to advance copies. He had so large a share in painting the much admired lap dog of a fashionable lady, that he claimed the work as his own, and Lawrence dismissed him. In 1818 Harlow visited Rome, and astonished the artists of that city by completing an effective copy of Raphael's "Transfiguration" in 18 days. Canova exhibited one of his pictures at his house, and procured his election as a member of the academy of St. Luke. His best original works are two designs from Shakespeare, "Hubert and Prince Arthur" and the "Trial of Queen Catharine." The principal characters in the latter are portraits of the Kemble family.

HARMATTAN, a dry, hot wind, which, blowing from the interior of Africa toward the Atlantic ocean, prevails in December, January, and February along the coast of that continent, from Cape Verd to Cape Lopez. It comes on at any time, continues sometimes one or two and sometimes even 15 or 16 days, and is accompanied by a fog which obscures the sun, rendering it of a mild red color. All vegetation is checked, young or tender plants are destroyed, and grass is turned to hay. It affects the human body also, making the eyes, nostrils, and lips dry, and at times causing the skin to parch and peel off; but it checks epidemics, and cures persons afflicted with dysentery, fevers, or cutaneous diseases. The harmattan is the same in its character as the *sirocco* of Italy and the *kamsin* of Egypt.

HARMER, Thomas, an English clergyman, born in Norwich in 1715, died at Wottesfield, Suffolk, in November, 1788. He was educated in London, and in his 20th year was ordained minister of the Independent church in Wottesfield. He published in 1764 "Observations on Various Passages of Scripture," illustrating them by quotations from books of oriental travel. An enlarged edition appeared in 2 vols. in 1776. The 5th and best edition was published under the editorial care of Dr. Adam Clarke (4 vols., 1816). His other works are "Outlines of a New Commentary on Solomon's Song, drawn by the Help of Instructions from the East" (1768), and a volume of miscellaneous writings, edited by Youngman (1823).

HARMODIUS AND ARISTOGITON, two Athenians, commonly reckoned among the martyrs

of liberty. Aristogiton had conceived a passion for Harmodius, a beautiful youth, in which Hipparchus, one of the Pisistratidæ, was his rival. Stung by jealousy, in conjunction with Harmodius and others, he formed a conspiracy to destroy the tyrant during the Panathenæic festival, at which the conspirators were present, with their swords concealed in garlands of myrtle. The plot succeeded; but Harmodius was slain by the guards, and Aristogiton arrested, 514 B. C. When subjected to torture by Hippias, the brother of Hipparchus, he named as his accomplices the best friends of the tyrant, who were immediately put to death. On the expulsion of Hippias in 510, the Athenians paid distinguished honors to Harmodius and Aristogiton, erecting statues and singing hymns to their memory, and decreeing that no slave should bear their names. In 307, when the Athenians wished to pay the highest honors to Antigonus and his son Demetrius Poliorcetes, they placed their statues near those of Harmodius and Aristogiton. To the mistress of Harmodius, who refused to disclose the names of the conspirators, was erected a tongueless statue, to commemorate the victory gained by woman over her love of talking.

HARMONICA, or *Armonica*, a musical instrument, in which the tone is produced by the vibration of bell-shaped glasses, caused by friction from the moistened finger. It was first contrived by Mr. Packeridge, an Irish gentleman, was improved by Mr. E. Delaval, a member of the royal society, and still further by Dr. Franklin, whose instrument had a compass of three octaves from G to g. The glasses, carefully tuned in semitones, were revolved by a pedal movement and touched by the tips of the fingers, occasionally moistened with water. Once tuned, it did not vary from the pitch, and the volume of tone was swelled or diminished by a greater or less pressure. The quality of the tone is exceedingly pure and sweet, but of such a penetrating character that it is painful to the ears of many sensitive persons. A somewhat similar application of glass vessels for musical instruments is described in the *Mathematische und philosophische Erquickungstunden*, published at Nuremberg in 1677; and a harpsichord harmonica, in which a key action was substituted for finger pressure, was made by Röllig at Vienna, and by Klein at Presburg. In one made by Abbate Mazzuchi, the friction was produced by a hair bow; and Stein, the celebrated organ builder, invented a stringed harmonica, in which strings were used instead of glasses, with a kind of spinet attachment, the effect of which was thought remarkable. Still another modification was the substitution of steel pegs for the glasses. The construction of Franklin's harmonica is fully described by him in his letters. His enthusiasm evidently expected for the harmonica an extended use, which none of the forms of the instrument have ever attained; nor has it been regarded by musicians or composers as

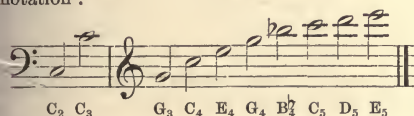
entitled to any higher rank than that of a musical curiosity or toy.

HARMONISTS. See RAPP, GEORG.

HARMONY (Gr. *ἀρμονία*, agreement or concord), in music, the agreeable sensation produced on the ear by the simultaneous sounding of various accordant notes. The discussion of this subject in its more general bearings would include the consideration of the whole theory of music; but we shall confine ourselves to an account of the conditions necessary to produce harmonious effects, and to an explanation of the reason of those conditions. From the days of Pythagoras to the year 1862 no true explanation had been given of the facts that the sounding together of notes forming certain musical intervals gives rise to agreeable sensations, while the simultaneous sounding of the notes of other intervals causes disagreeable or dissonant effects. It is true that Pythagoras, 2,400 years ago, had shown the relations existing between harmonious chords and the lengths of the vibrating strings producing their constituent notes. About the same time Tso-kin-ming, a friend of Confucius, taught that the five sounds of the ancient Chinese gamut corresponded to the five elements of their natural philosophy, water, fire, wood, metal, and earth, and that the numbers 1, 2, 3, and 4 are the source of all perfection. In the middle ages "the music of the spheres" of Pythagoras played an important part in the discussions on harmony; and according to Athanasius Kircher, music is the product of both the "macrocosm" and the "microcosm." Even a mind so profoundly scientific as that of Kepler was entangled in such mysticism; and such occult relations even in these days charm many musicians, more disposed to the pleasures of the imagination than to the toil of scientific reasoning. Euler, in his *Tentamen Novæ Theoriæ Musicæ* (1739), attempts to explain the facts of musical harmony by the hypothesis that the mind takes a delight in the sentiment of simple ratios of vibration. After Euler, D'Alembert, in his *Éléments de musique* (1762), adopted and developed the hypothesis of Rameau, who thought that he saw in the harmonics which exist in nearly all sounds suitable for music a rational explanation of the main principles of harmony. Another system of harmony was brought out in 1754 by Tartini, the celebrated violinist, who rediscovered the resultant tones of Sorge, and fancied that he had found in them a clue to the long sought explanation of consonance and dissonance. The honor attending the solution of this problem was reserved for H. Helmholtz, professor of physiology in the university of Heidelberg. In 1862 he published a work entitled *Die Lehre von den Tonempfindungen als physiologische Grundlage für die Theorie der Musik*, in which is laid the true physical basis of musical harmony, founded on a minute study of the auditory sensations. The main distinction between his views and the hypotheses of those who preceded him

is, that he refers the causes of consonance and dissonance to the sensations produced by continuous and discontinuous sounds, while all before him referred the facts of harmony to a psychological cause.—In order fully to appreciate Helmholtz's discovery, it will be necessary to preface an account of it with a few considerations on the causes and nature of sound; on the distinction between a simple and a composite sound; on the phenomena of interference and beats; and on the power of the ear to analyze a composite sound into its sonorous elements. Sound is the sensation caused by tremors sent from rapidly vibrating bodies through the air or other elastic medium to the ear. The vibrating body at the source of the sound, and the elastic medium between that body and the ear, may be of either solid, liquid, or gaseous matter; but generally the vibrating body is either a solid, as a string or tuning fork, or a mass of air, as in the case of organ pipes and nearly all wind instruments. But only vibrations the number of which in a second is comprised within a definite range can produce on the ear the sensation of sound. This range is between about 40 and 40,000 vibrations per second, the pitch of sounds rising with the number of vibrations producing them. As the velocity of sound in air having a temperature of 32° F. is 1,090 ft. per second, it follows that if we divide 1,090 by the number of vibrations the sounding body makes in one second, we shall have the distance from the sounding body through which the air is affected, or vibrated, after the body has made its first vibration; and here we take a vibration in the German and English sense, as a motion to and fro, and not to or fro as it is understood by the French. Thus, suppose a body to make one vibration in $\frac{1}{10}$ of a second, and then instantly to come to rest; the air in front of this vibrating body will be moved to a depth of $\frac{1090}{10}$, or 27½ ft.; and this depth of air affected by one vibration is called a wave length of sound. The half of this wave length nearest the body was formed by the body receding from the air in front of it, and therefore this half of the wave length is composed of rarefied air, or air the molecules of which are separated by more than their natural distances, while the other half of the wave is formed of condensed air, or air the molecules of which are forced near together. But this wave progresses forward with a velocity of 1,090 ft. per second, and as it passes through the air it causes those molecules over which it passes to oscillate once forward and once backward; and it follows that the air touching the drum of the ear will force this membrane inward and then outward, and thus a tremor is given to the fibrille of the auditory nerve. But if, instead of making only one vibration, the body continuously vibrates, then the waves succeed each other with perfect regularity, and, producing continuous oscillations in the air and ear, cause the continuous sensation necessary for the perception of a mu-

sical sound. If the body, instead of making 40 vibrations, made 8,000 per second (which corresponds to the highest note used in music), the wave length would amount to only $1\frac{1}{10}$ inch; yet this very short wave and the long one of $27\frac{1}{2}$ ft. travel with the same velocity of 1,090 ft. per second. The sounds produced by these vibrations are either simple or composite. A simple sound is a sound having only one pitch, while a composite sound is one composed of two or more definite and separable sounds having pitches generally in the ratio of 1 : 2 : 3 : 4 : 5, &c. This series of sounds is called the harmonic series. Thus, the sound of a tuning fork when mounted on its resonant box, or that of a gently blown closed organ pipe, is simple, for the ear can distinguish but one pitch in these sounds; while the sounds of piano or violin strings, or of reed organ pipes, are highly composite, and the ear can separate them into simple sounds whose numbers of vibration are to each other as 1 : 2 : 3 : 4 : 5, &c. For example, if we take a reed pipe giving C below the middle C of the piano (which note we will designate as C_2), we can separate the sound of this pipe into the following simple sounds: C_2 , C_3 , G_3 , C_4 , E_4 , G_4 , Bb_4 , C_5 , D_5 , E_5 ; or, expressed in musical notation :



These simple sounds all coexist in the sound of the reed pipe, but their relative intensities diminish as they ascend in pitch; that is, the lowest in pitch is the loudest, and serves to designate the position of the pipe in the musical scale. Now it has for a long time been known that those musical sounds which were best adapted to render the effects of musical composition, and which we distinguish for their brilliant or plaintive qualities, are always composite, and contain besides the fundamental sound the harmonic series; and indeed the *timbre* of a sound depends entirely on the number and relative intensities of its harmonics. On minute examination it has been found that a simple sound is produced only when the air near the ear oscillates forward and backward with the same kind of motion as exists in a freely swinging pendulum. If, however, the ear experiences the sensation of a composite sound, the air near it has a reciprocating motion, which is the resultant of as many pendulum vibrations as there are harmonics in the sound. Yet the ear is a powerful and subtle instrument for decomposing such complex motions into their simple vibratory components; for the ear, properly aided, can separate the composite sound of a reed pipe or of a vibrating string into 12 and more distinct simple harmonic vibrations. Those who are interested in this

subject of the analysis and synthesis of sound will find a full description of various experimental methods in a paper by Prof. A. M. Mayer "On an Experimental Confirmation of Fourier's Theorem, as applied to the decomposition of the vibrations of a composite sonorous wave into its elementary pendulum vibrations," &c., in the "American Journal of Science" (1874). According to Helmholtz, the ear accomplishes this analysis of sound by means of 3,000 little rods or cords, existing in the *ductus cochlearis* of the inner ear, and known as the rods of Corti. These rods are of graduated lengths and thicknesses like the strings in a piano, and appear to be tuned to 3,000 simple notes, equally distributed throughout the range of the seven octaves of musical sounds. Each rod is connected with a filament of the auditory nerve. The mode of action of this highly organized part of the auditory apparatus is as follows: the vibrations of a composite sound reaching the rods of Corti, each rod, being in tune with a simple sound or harmonic existing in the composite sound, enters into vibration and shakes its attached nerve filament, and thus the ear receives a sensation formed of as many simple sounds as really existed in the composite vibration. Indeed, it appears that the rods of Corti are set in vibration exactly as the strings of a piano vibrate to the elements of a note when we sing over the strings of the instrument.—We may now consider the manner of production of beats, and the effects they produce on the ear; and then we shall be in possession of the main facts necessary to explain the fundamental principles of musical harmony. When two sounds nearly in unison fall upon the ear, they produce alternate risings and fallings in the intensity of their resultant effect on the ear. These alternations of intensity are called beats, and are caused in the following manner: Suppose two sounds, produced by two bodies, one giving 2,000 vibrations in a second, the other 2,001. It is evident that if both bodies vibrate together at the beginning of a second, they will again vibrate together at the end of the second; therefore at these two instants the action of one of them on the air conspires with the action of the other, and thus we have an impression given to the air which is the sum of the two vibrations; but at the half seconds the motions of the two bodies are opposed, and therefore at these instants they will neutralize each other's action if their intensities of vibration are equal, and at the instant of the half seconds we shall have entire silence. Hence it follows that the number of beats per second given by any two vibrations will equal the difference in the number of vibrations these bodies separately give in one second. Their beats produce on the ear an intermittent action similar to that experienced by the eye when successive flashes of light fall upon it. These intermittent actions on the sensorium are always unpleasant, and even irritating. The

degree of unpleasantness, however, depends on the number of the beats or flashes per second, and also varies with the pitch of the sound or the color of the light. But when the beats have reached a certain number in a second, they no longer produce intermittent effects on the nerves; for the action produced by one beat lasts, without perceptible diminution, until the arrival of the following one, and the sensation becomes continuous; in other words, when the beats follow with sufficient rapidity, they blend together and form a smooth, sonorous effect, like a simple musical sound. This relation between discontinuous and continuous impressions on the nerves, and unpleasant and pleasant sensations, is at the foundation of Helmholtz's theory of musical harmony.—We must now consider the effects resulting when, instead of producing only simple sounds together, as above, we simultaneously produce composite sounds differing slightly in pitch. If we sound two tuning forks, each giving the middle C of the piano, we shall have two simple sounds in unison. Now gradually elevate one of them in pitch and observe the changing sensations. The harshness increases until they are separated about a tone; then the disagreeable sensation diminishes, and entirely vanishes when the notes have been separated by an interval equal to a minor third. But if, instead of sounding the forks, we use two reed pipes giving the same notes, we observe that the slightest departure from unison at once causes a very unpleasant sensation; the reason of this is, that besides the beats of the fundamental simple sounds of the pipes, we have the sensations produced by the beating of some 20 harmonics of their fundamentals. Therefore the tuning of reed pipes is difficult, but their intervals are defined with an extraordinary degree of sharpness. It is here also to be remarked that the number of beats per second given by any pair of harmonics is directly as their height in the harmonic series. Thus if the fundamental or first harmonics give 3 beats per second, the sixth harmonics will give 18 beats per second. Therefore, in sounding two such pipes, each giving 20 harmonics, we should have produced on the ear 632 beats per second, 3 belonging to the first pair of harmonics, and 60 to the 20th pair.—Helmholtz's discovery consists in the demonstration of the fact that the degree of smoothness or consonance of any given chord depends entirely on the number of elementary harmonics and resultant tones which beat together in the given notes, on the intensities of these beats, and on the number per second of beats produced by each dissonant pair of harmonics. This fact he proved by nearly every means known to modern science, and thus established a real physical cause for the harmonious or dissonant sensations we experience on combining various notes. We can best illustrate the truth of Helmholtz's theory and show his main results by giving in

musical notation the principal intervals of fundamental notes, indicated in minims, with their accompanying harmonics written over them in crotchets. Only the first six harmonics are indicated, because those of higher order are generally either absent from a musical sound, or exist with such feeble intensity as not greatly to affect the degree of consonance. The respective harmonics which beat we have connected together by straight lines, so that at a glance one can approximately determine the degree of consonance of a given interval. The intervals here given are the true intervals of the natural scale, and not the false intervals of the tempered scale. On the latter scale the only consonant interval is the octave. The intervals we have selected are the octave, the fifth, the fourth, the major third, the major sixth, and the minor seventh; the ratios of the vibrations giving the notes of these intervals are respectively as 1 : 2, 2 : 3, 3 : 4, 4 : 5, 3 : 5, and 9 : 16.



No dissonance here occurs because the harmonics of both notes are in unison.

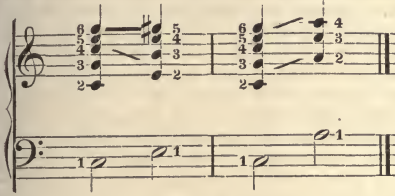


We have here two pairs in unison, 3-2 and 6-4; but a slight departure from perfect smoothness of effect is caused by the third harmonic of the higher note beating with the fourth and fifth of the lower. If the vibrations of the two fundamental notes of this interval are not rigorously as 2 : 3, there will be discord. Hence, on all instruments of fixed equal-tempered scales, as the organ or piano, even the interval of the fifth is slightly discordant, only the octave intervals being in tune.



The dissonance of this interval is greater than in the case of the fifth, because the harmonics 3-2 are both vibrations of intensity, and therefore give louder beats than the pairs 3-4 and 3-5 of the fifth. In the fourth we have also the additional beats of pairs 6-4 and 6-5.

THE MAJOR THIRD AND THE MAJOR SIXTH.



The major third and the major sixth are written together as they are about equally consonant, for the dissonance caused by the beats of pair 3-2, separated by a tone, in the sixth, about equals that of the weaker beating pair 4-3, separated by a semitone, in the major third.

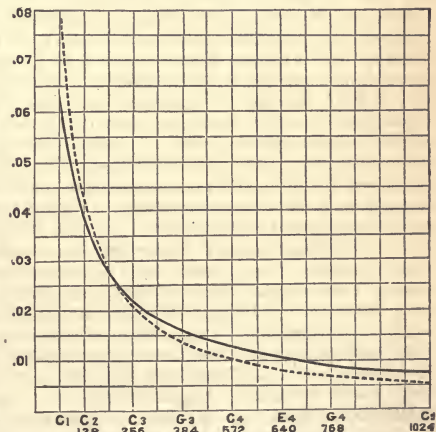


The minor seventh is the smoothest of that class of chords sometimes denominated discords, and is less dissonant than the minor sixth. Besides the beats of the harmonics existing as described in the above intervals, we have also the influence of the beats of the resultant tones, which are the products of the combined vibrations of the fundamental notes and of their harmonics. These resultant tones can produce beats either with harmonics or with other resultant tones. These resultant tones are of two kinds, viz.: difference tones and summation tones. Difference tones were discovered by Sorge in 1740, and their pitch is equal to the difference of the two vibrations of the sounds producing them. Summation tones were discovered by Helmholtz, and their pitch is equal to the sum of the vibrations of the two sounds producing them. It will be observed that Helmholtz's work is to a great extent merely qualitative; and although he indicates the existence of beats as the cause of discord, yet he does not give laws capable of quantitative expression, by which to determine beforehand the degree of consonance or dissonance existing in any given chord.—The recent research of Prof. Mayer of Hoboken, N. J., "On the Experimental Determination of the Law connecting the Pitch of a Note with the Duration of the Residual Sensation it produces in the Ear" (American Journal of Science, 1874),

first gave the duration in absolute time of the sensation of sounds after the exciting vibrations had ceased to exist outside the ear, and thus afforded the means of determining with quantitative exactness the smallest number of beats that two sounds must produce in order that they form a consonant interval. This latter condition will of course be fulfilled when the beats become just rapid enough in their succession to produce a continuous sensation in the ear. The following is the important law discovered by Prof. Mayer: If N equal the number of vibrations producing any given note, and D equal, in the fraction of a second, the duration of the residual sensation (that is, the time during which the sensation remains after the vibrations outside the ear have ceased), then

$$D = \left(\frac{58248}{N + 28} \right) \cdot 0001.$$

The denominator of the (vulgar) fraction thus determined will be the smallest number of beats per second which one simple sound must make with another in order that harshness or dissonance shall entirely disappear from the interval. Thus the simple note giving the middle C of the piano makes 264 vibrations per second, and the residual sensation of its sound remains on the ear $\frac{1}{48}$ of a second; therefore the note which will make 48 beats per second with this C will form an interval free from all harshness. The number of vibrations of this note will be $264 + 48$, or 312, which is D, and forms with C the interval of the minor third. Hence the nearest note to this C which will form with it a harmonious combination is its minor third. If we in like manner calculate the nearest interval to form



Curve showing the Relation of Pitch and Duration.

a consonance with the C below the middle C, we shall find it to be the major third. This nearest consonant interval contracts as the pitch ascends, so that for the C of the fifth octave above the middle C (the highest octave used in music) the interval has contracted to

$\frac{1}{16}$ of a semitone. Prof. Mayer has also determined the other limit of the effects of beats by ascertaining in the different octaves the number of beats which produce the greatest harshness or dissonance on the ear. We give above a curve which at a glance shows the connection between the pitch of a note and the duration of the residual sensation. The curve approaches closely to an equilateral hyperbola (which latter curve is also given in a dotted line as a means of comparison); it would indeed coincide with the hyperbola if the duration of the residual sensation were simply inversely as the pitch. The units of division on the horizontal line equal 64 vibrations per second, while the units on the vertical line equal $\frac{1}{16}$ of a second. To find by means of this curve the duration of a simple sound, obtain the point on the horizontal line corresponding to its number of vibrations, and then erect from this point a perpendicular reaching to the curve. The length of this perpendicular in units of the vertical scale will give the duration of the residual sensation of the sound in the fraction of a second; and the denominator of this (vulgar) fraction gives the number of beats which the note will have to make with a neighboring one to form the smallest consonant interval.—Although the science of counterpoint is based upon the principles of harmony, yet the discussion of this subject leads into the higher æsthetic principles of musical composition; we therefore refer to the article *Musio* for information on that subject.

HARMS, Claus, a German theologian, born at Fahrstedt, Holstein, May 25, 1778, died in Kiel, Feb. 1, 1855. He was the son of a miller, and for some time followed his father's business. He became chief pastor of the church of St. Nicholas and provost at Kiel in 1835, and councillor of the supreme consistory in 1842. Having lost his sight, he resigned his office in 1849. He celebrated the jubilee of the reformation in 1817, by propounding 95 new theses, in which the doctrines of the total depravity of man and the indispensable necessity of faith were maintained. Against him Baumgarten-Crusius wrote the *XCV. Theses Theologicae contra Superstitionem et Profanationem*. The theses and theological works of Harms gave the first strong impulse to a great revival of the orthodox Lutheran theology in Germany. He published *Pastoral Theologie* (3 vols., 2d ed., 1837); *Weisheit und Witz* (1850); *Selbstbiographie* (2d ed., 1851); and *Vermischte Aufsätze* (1853).

HARNESS, William, an English clergyman, born about 1784, died in November, 1869. He was lame, besides suffering from severe illness at Harrow, where Lord Byron, his schoolmate and friend, offered him protection with these words: "Harness, if any one bullies you, tell me, and I'll thrash him if I can." He afterwards studied at Cambridge, took orders, and held several preferments in London. He wrote dramas and poems, and published "The Con-

nection of Christianity with Human Happiness" (2 vols., 1823), a variorum edition of Shakespeare (8 vols., 1825), "Parochial Sermons" (1838), and other works. His "Literary Life," by the Rev. A. G. L'Estrange (1871), contains much matter relating to Byron and other celebrities of his time.

HARNETT, a central county of North Carolina, intersected by Cape Fear river, and watered by Little river; area, 675 sq. m.; pop. in 1870, 8,895, of whom 3,038 were colored. The surface is hilly, and the soil in parts productive. Tar and turpentine are largely produced. It is intersected by the Western railroad of North Carolina. The chief productions in 1870 were 8,571 bushels of wheat, 125,410 of Indian corn, 64,290 of sweet potatoes, and 334 bales of cotton. There were 588 horses, 1,791 milch cows, 3,788 other cattle, 3,793 sheep, and 10,194 swine. Capital, Summerville.

HARNETT, Cornelius, an American revolutionary statesman, born in England, April 20, 1723, died at Wilmington, N. C., April 20, 1781. He came in early life to America, and prior to the disputes with Great Britain was a man of wealth and distinction, residing on a large estate near Wilmington, N. C. He was one of the earliest to denounce the stamp act and kindred measures. In 1770-'71 he was representative of the borough of Wilmington in the provincial assembly, and chairman of the most important committees of that body. In 1772 he was appointed by the assembly, with Robert Howe and Maurice Moore, to prepare a remonstrance against the appointment, by the royal governor Martin, of commissioners to fix the southern boundary of the province. Josiah Quincy, who visited him in the following year, called him "the Samuel Adams of North Carolina;" and, as the revolution approached, he was its master spirit throughout the Cape Fear region. He was elected to the provincial congress in 1775, and to the congress at Halifax, on the Roanoke, in 1776, and drew up the instructions to the North Carolina delegates in the continental congress. When in 1776 Sir Henry Clinton appeared with a British fleet off Cape Fear, Harnett and Howe were excepted, as arch-rebels, from the terms of a general pardon. On the arrival of the Declaration of Independence at Halifax, July 26, 1776, Harnett read it to a great concourse of citizens and soldiers, who took him on their shoulders and bore him in triumph through the town. In the autumn he was on the committee for drafting a state constitution and bill of rights, and afterward as member of the continental congress he signed the articles of confederation. When in 1780-'81 the British held possession of the country around Cape Fear, Harnett was made a prisoner, and died while a captive.

HAROLD I., king of the Anglo-Saxons, surnamed HAREFOOT from his swiftness in running, died at Oxford, March 17, 1040. He was the second of three sons of Canute the Great, who

had expressed the wish to bestow his kingdoms of Norway, England, and Denmark severally upon his sons Svend, Harold, and Hardicanute. At the council which met at Oxford upon the death of Canute (1035), to elect a new sovereign for England, the chiefs of Danish descent preferred Harold; the Saxons preferred Hardicanute, because he was the son of the widow of their late king, Ethelred. Harold got possession of London, and of the country north of the Thames; and Hardicanute, who claimed the west, and by the marriage contract of his mother ought to have succeeded to the crown (his brother being illegitimate), was soon after deposed, through the intrigues of Earl Godwin, upon the promise of Harold to espouse the daughter of that nobleman. Harold and Godwin meantime conspired to destroy the Saxon princes, Alfred and Edward, sons of Ethelred, and they were inveigled from their retreat in Normandy. Alfred was hurried to the isle of Ely and condemned to lose his eyes, and died of the wounds; but his brother, afterward Edward the Confessor, escaped back to Normandy. Harold, having now seized the treasure of his father's widow, who escaped to Bruges, was soon master of all England. His reign was unmarked by other notable events. He was buried at Westminster; but his body, disinterred by order of Hardicanute, who succeeded him, was cast into the Thames. It was recovered by a fisherman, and secreted in a Danish cemetery in London.

HAROLD II., king of the Anglo-Saxons, and the last king of that lineage, second son of Godwin, earl of Wessex, killed in battle, Oct. 14, 1066. He was a leader in the armies of Edward the Confessor, and did good service in battles with the Welsh. About 1065 he was shipwrecked on the coast of Ponthieu and made prisoner by the earl Guy, who delivered him over to William of Normandy. William detained him until he had taken an oath to support the Norman's pretensions to the English crown after the death of Edward; but when that event took place (Jan. 5; 1066), he caused himself to be proclaimed by an assembly of the thanes and the citizens of London, and was crowned in London the next day. Edward, it is asserted, had willed the succession to the duke of Normandy, but had been prevented from taking steps for the security of his testament. Harold claimed a similar testamentary right. Harold's brother Tostig, a man of great talent and activity, and filled with deadly hatred against his brother for fancied wrongs, appealed to Harold Hardrada of Norway, who promised to invade England. Tostig collected a force in Flanders, after planning operations also with William, and ravaged the southern coasts. He was defeated afterward by the earls of Mercia and Northumbria, and retired to Scotland to await the arrival of his allies. William meanwhile sent an embassy to Harold demanding the crown of England. The new king gave a disdainful reply, and prepared to

receive the invaders. His attention appears to have been directed chiefly to the side of Normandy; for the king of Norway, accompanied by Tostig, landed unopposed at Scarborough. They were met near York by the northern earls, who were defeated, and, retreating to York, were besieged in that city. A few days later Harold arrived to their relief (Sept. 25, 1066), and a battle was fought in which the king of Norway and Tostig were killed. The Norwegians, escaping to their ships, were suffered to withdraw unmolested from the coast. Three days afterward the duke of Normandy landed at Bulverhithe, and advanced to Hastings, where on Oct. 14 the famous battle was fought by which Harold lost his life, and William became king of England. (See **HASTINGS**.)

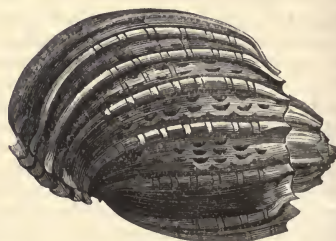
HAROUN AL-RASHID (Aaron the Just), fifth caliph of the dynasty of the Abbassides, born in Rei about A. D. 765, died in Tus early in the spring of 809. He was the grandson of Abu Jaffar, surnamed Al-Mansour, and the son of the caliph Mahdi by the slave Khaizeran. In the reign of his father he led an army of 95,000 Persians and Arabs against the Byzantine empire, then ruled by Irene. He traversed Asia Minor, defeated the Greek general Nicetas, penetrated to the Bosphorus (781), encamped on the heights of Chrysopolis (now Scutari), opposite Constantinople, and forced the empress to engage to pay an annual tribute of 70,000 dinas of gold, and to prepare the roads for his return to the Tigris. In 786 he succeeded his elder brother Hadi, who had vainly attempted to exclude him from the throne, and had even given orders for his execution, which was only prevented by his own sudden death. By his conquests and vigorous internal administration Haroun raised the caliphate to its greatest splendor, and made his reign esteemed the golden era of the Mohammedan nations. His favorite ministers were Yahya and his son Jaffar, of the ancient Persian family of the Barmecides, whose ancestors had for many generations been hereditary priests at the fire temple of Balkh, and who now rapidly exalted the family to the highest dignities under the caliphate. While Haroun was occupied in fortifying the frontier provinces against the Greeks, Musa the Barmecide captured the chiefs of two hostile factions in Syria, brought them to Bagdad, and ended their dissensions; Fadhl, son of Yahya, conquered Cabool and pacified a rebellion in Dailem; and Jaffar joined to the office of vizier that of governor of Syria and Egypt. The whole internal administration of the empire fell into the hands of the Barmecides. They adorned the court with luxury, patronized letters and science, gave festivals, and made a prodigal use of the riches which they amassed. The reign of Haroun is chiefly sullied by the sudden disgrace which he inflicted on them in 803, condemning those from whose talents and services he had most profited to imprisonment or death. (See **BARMECIDES**.) He had devastated the Byzantine ter-

ritories as often as Irene had declined payment of the annual tribute. In 803 her successor Nicephorus demanded restitution of all the sums the empress had paid. "The caliph replied: "In the name of the most merciful God, Haroun al-Rashid, commander of the faithful, to Nicephorus, the Roman dog. I have read thy letter, O thou son of an unbelieving mother. Thou shalt not hear, thou shalt behold, my reply." He immediately traversed and ravaged a part of Asia Minor, laid siege to Heraclea, brought Nicephorus to acknowledge himself a tributary, and retired triumphant to his favorite palace of Racca on the Euphrates. The peace being violated in 806, he returned rapidly in the depth of winter, and at the head of 135,000 men defeated Nicephorus in Phrygia, in a battle in which the Greek emperor was three times wounded and 40,000 of his subjects were slain. Again the tribute was refused, and Haroun returned in 808 with 300,000 men, desolated Asia Minor beyond Tyana and An-cyrra, demolished Heraclea, devastated the islands of Rhodes, Cyprus, and Crete, and imposed a humiliating treaty on Nicephorus. It was soon broken, and Haroun again returned, took Sebaste, and swore never again to make peace with so perfidious an enemy. A revolt breaking out in Khorasan, the caliph died while on his march thither. In his latter years he corresponded with Charlemagne, and in 807 he sent him a tent, a clepsydra, an elephant, and the keys of the holy sepulchre. He performed the pilgrimage to Mecca nine times, cultivated poetry and the arts and sciences, protected many illustrious scholars, and is the principal hero of the Arabian tales. He selected ministers under whose wise administration prosperous towns sprang up, commerce flourished, and Bagdad was enlarged and adorned and made the centre of Arabic civilization.

HARP (Sax. *hearpa*, Ger. *Harfe*), a musical stringed instrument of a triangular shape, the chords of which are distended in parallel directions from the upper limb to one of the sides, and are set in vibration by the action of the thumb and fingers. Its origin cannot be ascertained; but it was familiar to the Hebrews in the time of the earlier prophets, and, as appears by the sculpture in a tomb near the pyramids of Gizeh, was known to the Egyptians probably as early as 2000 B. C. The researches of recent travellers show that the Egyptians attained great perfection in the construction of the harp, which was frequently richly ornamented and of elegant form, having from 4 to 21 chords, and in the later specimens strikingly resembled those in present use. In the Paris collection of Egyptian antiquities is a triangular harp of 21 chords, which, like all other Egyptian harps of which we have representations, has no pole or pillar to support the upper limb of the instrument. That the omission was intentional there seems no doubt; but it is difficult to conceive how the tension of the strings could have been resisted. To

the Greeks it seems always to have been unknown, and the Romans probably had no knowledge of it in anything like its present form. It was common to the northern races of Europe in the early centuries of the Christian era, and in the opinion of many antiquaries was original among them. In Ireland and in Wales harps of many strings and of elegant form were in use as early as the 5th and 6th centuries, and in the former it was adopted as the national emblem. In Wales it is still cherished as the national instrument, and annual trials of skill in its use take place. The introduction of pedals, whereby it became possible to modulate into all keys, first gave the harp a higher position than that of an instrument of accompaniment, and the improvements of Sébastien Érard have made it capable of performing any music written for the pianoforte. His double action harp, perfected in 1808, has a compass of six octaves, from E to E, with all the semitones, and even quarter tones. Its form and tone have long made it a favorite instrument for the drawing room. In the orchestra it is more sparingly used.

HARP (*harpa*), a genus of gasteropod mollusks of the family of whelks or *buccinidae*. The shell is ventricose, with numerous ribs at regular intervals, the shape and the ribs resembling the outline and the strings of a harp; the aperture is large, notched in front, and without operculum. The foot is very large, crescent-



Harpa ventriculata.

shaped in front, and deeply divided from the posterior part. There are about a dozen species, inhabiting deep water and soft bottoms in the East Indies and the Pacific islands; they are carnivorous; the shells are finely colored and of elegant shape, generally about three inches long. Four fossil species have been found in the eocene strata of France.

HARPER, a S. county of Kansas, bordering on the Indian territory, and drained by branches of the Nescatunga and Arkansas rivers; area, 1,152 sq. m.; still unsettled.

HARPER, Robert Goodloe, an American lawyer and statesman, born near Fredericksburg, Va., in 1765, died in Baltimore, Md., Jan. 15, 1825. His parents during his childhood removed to Granville, N. C. In his 15th year he joined a troop of horse, and under Gen. Greene served during the latter part of the southern revolutionary campaign. He graduated at Princeton

college in 1785, studied law in Charleston, S. C., settled in the interior of the state, and became known by a series of newspaper articles on the proposed change in the state constitution. He was soon after elected to the legislature, and in 1794 to congress, where he supported the administrations of Washington and John Adams, and was regarded as one of the leaders of the federal party. In 1801 he retired from congress, and, having married a daughter of Charles Carroll of Carrollton, removed to Baltimore. At the Maryland bar he attained great eminence, and was associated with Joseph Hopkinson as counsel for Judge Chase of the supreme court, when under impeachment, the trial resulting in an acquittal, March 5, 1805. In 1815 he was elected United States senator. In 1819-'20 he visited Europe, and on his return resumed the practice of his profession. Selections from his writings and speeches were published in Baltimore in 1814.

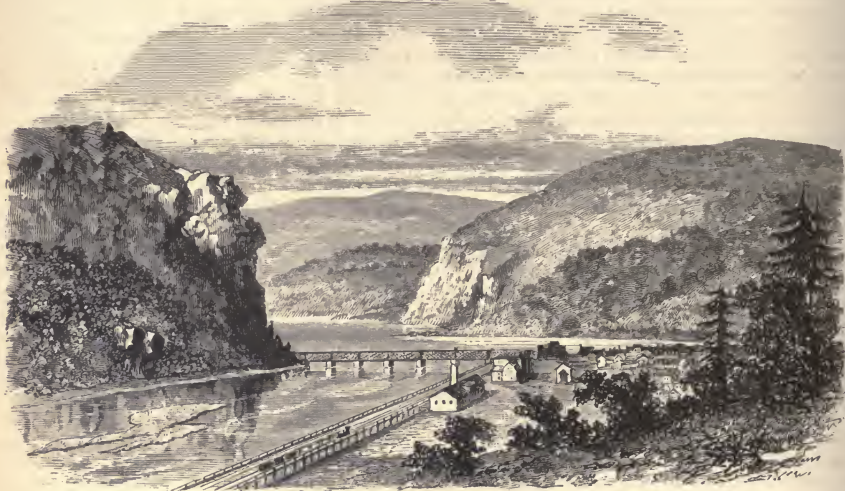
HARPER AND BROTHERS, a firm of American printers and publishers, originally consisting of JAMES, born in 1795, died in New York, March 17, 1869; JOHN, born in 1797; JOSEPH WESLEY, usually called Wesley, born in 1801, died in Brooklyn, Feb. 14, 1870; and FLETCHER, born in 1806. They were the sons of a farmer at Newtown, Long Island. At the age of 16 James and John were apprenticed to different printers in New York. Having concluded their apprenticeship, they established themselves in business, at first only printing for booksellers, but soon began to publish upon their own account. Wesley and Fletcher Harper were apprenticed to their elder brothers, and as they became of age were admitted as partners; and the style of the firm was about 1825 changed from "J. and J. Harper" to "Harper and Brothers." They soon became the leading publishers in America. In 1853 their establishment occupied nine contiguous buildings in Cliff and Pearl streets, filled with costly machinery and books. On Dec. 10 of that year the whole was burned to the ground, in consequence of a workman engaged in repairs having thrown a burning paper into a tank of benzine, which he mistook for water. Most of their stereotype plates were stored in vaults, and were saved; but the loss in buildings, machinery, and books amounted to \$1,000,000, upon which there was only \$250,000 insurance. The next day they hired temporary premises, and employed the principal printers and binders in New York, Boston, and Philadelphia in reproducing their books. Before the ruins of the fire could be cleared away the plans for their new edifice were prepared. It covers about half an acre of ground, extending from Cliff street to Franklin square in Pearl street, and, including cellars, the structure is seven stories high. It is absolutely fire-proof, and constitutes probably the most complete publishing establishment in the world, all the operations in the preparation and publication of a book being carried on under a single roof,

and the regular number of employees in the premises being about 1,000 of both sexes. Besides the books published, they issue three illustrated periodicals: "Harper's Magazine," established in 1850, a monthly, devoted to literature and the arts; "Harper's Weekly," established in 1857, devoted to literature and topics of the day; and "Harper's Bazar," established in 1867, devoted to the fashions, literature, and social life.—James Harper was in 1844 elected mayor of the city of New York for the succeeding year, and he was subsequently put forward for the governorship of the state; but he preferred to conduct the business of the firm rather than engage in public life. In March, 1869, while driving in Fifth avenue, his horses took fright, and he was thrown from his carriage; he was taken up insensible, and died two days afterward. Wesley Harper, who for many years had charge of the literary department, died after a long illness. After the death of his two brothers John Harper withdrew from active business; and the firm was reorganized by the admission of several of the sons of the original partners. These, after receiving a careful education, several of them at Columbia college, entered the house, each serving a regular apprenticeship in some branch of the business. The firm now (1874) consists of John Harper and his two sons, John Wesley, born in 1830, and Joseph Abner, born in 1833; Fletcher Harper, and his son Fletcher, jr., born in 1829; Philip J. A., son of James, born in 1824; and Joseph Wesley, son of Wesley, born in 1830.

HARPER'S FERRY, a town of Jefferson co., West Virginia, on the Potomac river, which forms the boundary of the state with Maryland, and at the mouth of the Shenandoah, where the united streams force their passage through the Blue Ridge, 45 m. N. W. of Washington; pop. about 2,500. It is built around the base of a hill, and is connected by a bridge with the opposite bank of the Potomac. The Baltimore and Ohio and the Winchester, Potomac, and Strasburg railroads unite here, and the Ohio and Chesapeake canal runs along the Maryland bank. Before the civil war it was the seat of an extensive and important United States armory and arsenal. It has a large flouring mill, a college for colored youth, five or six schools, and five churches. It has not yet recovered from the effects of the war. The scenery around Harper's Ferry is celebrated for its striking beauties. Thomas Jefferson pronounced the passage of the Potomac through the Blue Ridge "one of the most stupendous scenes in nature, and well worth a voyage across the Atlantic to witness."—The place acquired some notoriety just previous to and during the civil war. On Oct. 16, 1859, John Brown, at the head of a small party of abolitionists, seized upon the town and armory buildings, of which he held possession for more than a day, when he was captured. (See BROWN, JOHN.) On April 18, 1861, the arsenal was

seized by a party of insurgents, and the workshops were partly burned. The place was afterward alternately in the hands of both parties. In September, 1862, a Union force of about 12,000 men, under Col. Miles, was stationed here. On the 12th, four days before

the battle of Antietam, a strong confederate force under Jackson and A. P. Hill appeared before Maryland heights on the Maryland shore, and early in the morning of the 13th drove the Union troops stationed there behind their breastwork. This was soon after taken,



Harper's Ferry.

when the federals withdrew across the river. On the same day the confederates established batteries on Loudon heights on the Virginia shore, and on the 14th they opened fire both from these and Maryland heights, renewing it at daybreak of the 15th from seven commanding points. The federal guns returned fire from Bolivar heights, but ineffectually, and Col. Miles surrendered his force (being mortally wounded almost in the act), the cavalry of which alone had escaped in the night. The confederates made about 11,000 prisoners, and captured 73 guns, 13,000 small arms, and a considerable amount of stores.

HARPIES (Gr. *Ἄρπυιαι*, from *ἀρπάζειν*, to snatch), in Greek mythology, fabulous monsters, said to have been the daughters of Neptune and Earth, or, according to Hesiod, of Thanos and Electra. In Homer they are merely personified storm winds, who were believed to have carried off any person that had suddenly disappeared. In Hesiod they are fair-haired and winged maidens who surpass the winds in swiftness, and are called *Aëlle* and *Ocyete*; but in later writers they are represented as disgusting monsters, with heads like maidens, faces pale with hunger, and claws like those of birds. The harpies ministered to the gods as the executors of vengeance. They were two or three in number, and dwelt in the *Strophædæan* isles, in the Ionian sea. The most celebrated myth in which the harpies figure is that of

the blind Phineus, whose food they had been commissioned to snatch away as often as it was placed before him. The Argonauts arrived at his residence while he was thus tormented, and freed him from the persecution. In the famous harpy monument discovered in Lycia by Sir C. Fellowes, and now in the British museum, the harpies are represented in the act of carrying off the daughter of Pandaræus.

HARPOCRATES. See **HORUS**.

HARPOCRATION, **Valerius**, a Greek philologist, who according to some flourished in the 2d century A. D., and according to others about the middle of the 4th. He was a native of Alexandria in Egypt, and the author of a valuable lexicon, still extant, to the works of the Attic orators. The earliest edition was published at Venice in 1503; the most recent is that of Bekker, which appeared at Berlin in 1833.

HARPSICHORD, a keyed musical instrument, somewhat in the form of a grand piano, in which the sounds are produced by the action of oblong slips of wood called jacks, furnished with crowquill plectrums, and moved by finger keys, upon a series of stretched wires, resembling a horizontal harp. It was provided with stops for increasing or diminishing the power of the strings, and with a swell; and the best instruments had a compass of five octaves, from double F below the base to F in altissimo. The harpsichord was in use as early as the 15th century, and gradually took the place of the spinet

and virginals, on which it was an improvement. It remained the highest form of the keyed instrument until the introduction of the piano-forte into general use in the latter part of the 18th century.

HARPY, in mythology. See **HARPIES**.

HARPY, a bird of prey, of the subfamily *aquilinae* or eagles; the *harpyia destructor* (Cuv.) or *thrasaetus harpyia* (Linn.), and the crested, crowned, royal, tyrant, and destructive South American eagle of authors. The bill is strong, much curved at the acute tip; the wings moderate, reaching beyond the base of the tail, the fourth, fifth, and sixth quills the longest; tail long, broad, and slightly rounded; tarsi short and very thick; toes robust, armed with powerful claws. The length is from 2½ to 3 ft., and the spread of the wings 5 to 6 ft. The bill is black, the head crested; the general color is dark brown above and white below, the feathers of the breast very long and loose; the tail barred with brown and black, and the vent and thighs with black and white. Several varieties of plumage occur, which have been made characters of different species, but Gray describes only one in the genus. The harpy eagle lives in the dark forests of intertropical America, especially near the borders of great rivers; it preys on sloths, monkeys, large birds, and on young deer and other quadrupeds of that size.



Harpy (*Thrasaetus harpyia*).

Its strength and courage are such that it will attack very large animals, and even man himself, if the Indians are to be believed.

HARRIER, a variety of the hound (*canis sagax*, Linn.), used in hare hunting. The ancient harrier (*chien courant* of the French) had a moderately long, broad muzzle; thick and rounded head; large, long, and pendent ears; robust body, stout limbs, erect tail, and short hair, varied with black, brown, and yellowish spots. The modern improved harrier is a miniature fox hound, with shorter ears, an acute sense of smell, great speed, and a height of about 18 in. The old harrier was larger,

slower, and more inclined to dwell on the scent; the modern breed does not generally allow the hare to double on its tracks, but forces it into a straight course, running it down in about 20 minutes. The pack of Sir John Dashwood King, considered the model of this



Harrier.

dog, originated from a small fox hound of pure breed, which was so celebrated that he was sold for the enormous sum of £700. The old harrier came near the beagle in appearance and manner of hunting. There are several breeds, of more interest to the sportsman than to the zoölogist.

HARRIER, a hawk of the subfamily *cercinae* of Gray and *milvinae* of later ornithologists, and of the genus *circus* (Lacépède). The genus is characterized by a rather large head and a face partially encircled by a ring of short prominent feathers as in the owls; bill short, compressed, curved from the base, with the lateral margins festooned; nostrils large; wings long and pointed, with the third and fourth quills nearly equal and longest; tail long, wide, and rounded on the sides; tarsi long and slender, toes moderate, and claws rather slender and weak. About 15 species are described in various parts of the world, generally found in open uncultivated countries, in marshes, and along barren sea coasts. The flight is not very swift, but easy and graceful, and generally performed in a sailing manner within a few feet of the ground. The American harrier, marsh or hen hawk (*C. Hudsonius*, Linn.), has in the male a length of about 18 and an extent of wings of 44 in., and in the female a length of 21 and a spread of about 47 in. The form is rather long and slender; the general color above is pale bluish cinereous, which prevails also on the breast; the upper tail coverts white; dark fulvous tinges on the back of the head; under parts white, with more or less heart-shaped spots and longitudinal marks of reddish fulvous; quills brownish black, tinged with ashy on the outer webs, and the inner mostly white; tail cinereous, nearly white on the inner webs, and obscurely banded with brown, its under

surface and the under wing coverts white. In the young birds the upper parts are dark brown, with dull rufous edges to many of the feathers; under parts reddish white, with brown stripes, and upper tail coverts white. It is found throughout North America from Mexico to the arctic regions, from the Atlantic to the Pacific, and in Cuba. It breeds in most parts of the United States, and is often seen in flocks of 20 or 30. When paired, the sexes keep together, and assist each other in the care of the young. The nest is generally made on the ground, previously scooped out, of dried grasses, and of considerable bulk; sometimes they build in low bushes. The eggs, about four, are rounded, smooth, $1\frac{1}{4}$ by $1\frac{1}{2}$ in., bluish white, with a few marks of pale reddish brown. The bird skims over the open fields, diligently searching for food, which consists of crickets, lizards, frogs, snakes, and small birds and quadrupeds; it is fond of visiting remote poultry yards after young chickens and gos-



Ring-tailed Harrier (*Circus cyaneus*).

lings, though a hen of ordinary courage is usually able to drive it off; it rarely strikes its victims on the wing. The ring-tailed harrier of Europe is the *C. cyaneus* (Linn.); there are also Montagu's harrier (*C. cineraceus*, Mont.) and the moor or marsh harrier (*C. aeruginosus*, Linn.), having similar habits with the American species.

HARRING, Harro Paul, a German author, born at Ibensdorf, near Husum, in Schleswig, Aug. 28, 1798, died by his own hand in the island of Jersey, May 25, 1870. He was the son of a landed proprietor of Friesland, but received only a scanty education, and was obliged to accept a small clerkship in the custom house. Subsequently he devoted himself to painting and literature in various places, and after publishing two volumes of poetry at Schleswig in 1821 he wrote a sketch of his adventurous life and travels entitled *Rhonghar Jarr, Fahrten eines Friesen in Dänemark, Deutschland, Ungarn, &c.* (4 vols., Munich, 1828). In 1828

he joined a Philhellenic expedition to Greece, but soon went to Rome, and next to Warsaw, where he served for a few months in the army. His Polish experiences were embodied in his novel *Der Pole* (3 vols., Baireuth, 1831), and in his *Memoiren über Polen unter russischer Herrschaft* (2 vols., Nuremberg, 1831; French, Strasburg, 1833). On account of his revolutionary tendencies he was subsequently expelled from Bavaria and Saxony, and in 1836 he was arrested in Bern and sent to England, where in 1837 he was wounded in a duel. He next attempted to publish in Heligoland revolutionary songs for circulation in Germany, but was arrested and sent back to England. On returning to that island in 1839 he was sent as a prisoner on a vessel bound to England, but jumping overboard he was picked up by a French ship, and afterward lived successively in England, Brazil, and the United States. In 1849 he arrived in Norway, whence he was expelled in the following year. He then became a member of the European central democratic committee in London, to which city he returned in 1856 after having been in 1854 under arrest in Harburg, and after having spent again some time in Brazil. Although he occasionally received assistance from his friends at subsequent periods, misery and discontent made him commit suicide. His publications comprise, besides poems, plays, and miscellaneous writings, many novels, of which "*Dolores*," the scene of which was in South America, written in English and published in New York in 1844 (German, 4 vols., Basel, 1858-'9), is considered the best.

HARRINGTON, James, an English political writer, born at Upton, Northamptonshire, in January, 1611, died in Westminster, Sept. 11, 1677. He entered Trinity college, Oxford, in 1629, and after leaving the university travelled on the continent, visiting France, Italy, and the Hague, where he entered Lord Craven's regiment, then quartered in that city. On his return to England he lived for a time in retirement, but in 1646 was appointed to wait upon Charles I. during his confinement. The king became strongly attached to him, and made him groom of the bedchamber; and Harrington, though a republican in theory, became loyal to the person of the monarch, following him even to the scaffold. After the death of Charles he composed his great work, the "*Oceana*," which was seized by order of Cromwell while in the press; but he was finally permitted to publish it in 1656, and even to dedicate it to Cromwell himself. The "*Oceana*" is a kind of political romance, like Plato's "*Republic*" and the "*Utopia*" of Sir Thomas More, in which Harrington describes an imaginary ideal republic. It attracted much attention, and was answered by several persons, the principal work written in reply being Baxter's "*Holy Commonwealth*." In 1659 Harrington published an abridgment of his work, under the title of "*The Art of Law-giving*," and instituted a club called the "*Rota*"

for the propagation of his principles, which was dissolved in February, 1660. He was arrested on a charge of treason, Dec. 28, 1661, being suspected of an intent to overthrow the government and establish a republic. His health was impaired and his mind became deranged by his imprisonment, and after a time he was liberated through the intercession of the earl of Bath. He went to London, where he partially recovered his bodily health, but never regained the full vigor of his intellect. Besides the "Oceana," Harrington published "The Grounds and Reasons of Monarchy Considered," "The Prerogative of Popular Government," "A Model of Popular Government," several political tracts, and a number of minor works, among which is a translation of part of the works of Virgil. His political writings have been several times republished; an edition, with his life by Toland, in 1700, in 1 vol. fol.; the best by Thomas Brand Hollis in 1771.

HARRINGTON, Sir John. See HARRINGTON.

HARRIOT, Thomas, an English mathematician, born in Oxford in 1560, died in London, July 2, 1621. He received the degree of B. A. at Oxford in 1579, and was a member of Sir Walter Raleigh's expedition to Virginia in 1584, writing on his return an account of the country, under the title of "A Brief and True Report of the new-found Land of Virginia," which was republished in vol. iii. of Hakluyt's "Voyages." He was introduced by Raleigh to the earl of Northumberland, received from him a pension of £300, and afterward devoted himself to mathematical researches, which were published in 1631 by his friend Walter Warner, under the title, *Artis Analyticae Praxis ad Aequationes Algebraicas Resolvendas*. He corresponded with Kepler upon the theory of the rainbow, and it appears from his manuscripts that he observed the spots upon the sun before he could have known of Galileo's discovery of them.

HARRIS. I. A W. county of Georgia, separated from Alabama by the Chattahoochee, and drained by several small branches of that river; area, about 440 sq. m.; pop. in 1870, 13,284, of whom 7,493 were colored. It has a greatly diversified surface; the E. part is traversed by the Pine and Oak mountains, and large tracts of land are covered with forests. The chief productions in 1870 were 24,226 bushels of wheat, 255,976 of Indian corn, 62,914 of sweet potatoes, and 8,163 bales of cotton. There were 964 horses, 1,537 mules and asses, 2,647 milch cows, 4,015 other cattle, and 9,613 swine. Capital, Hamilton. **II.** A S. E. county of Texas, bordering on Galveston bay, bounded N. and E. by San Jacinto river, and intersected by Buffalo bayon, both of which are navigable by steamboats; area, 1,832 sq. m.; pop. in 1870, 17,375, of whom 6,509 were colored. The surface is a fertile alluvial plain, nearly destitute of timber except along the streams, and covered with rich savannas which pasture large numbers of horses and cattle.

The Houston and Texas Central, the Houston and Great Northern, the Galveston, Houston, and Henderson, the Galveston, Harrisburg, and San Antonio, the Texas and New Orleans, and the Houston Tap and Brazoria railroads traverse it. The chief productions in 1870 were 99,977 bushels of Indian corn, 38,895 of sweet potatoes, and 1,064 bales of cotton. There were 2,833 horses, 4,561 milch cows, 1,204 working oxen, 27,544 other cattle, 5,713 sheep, and 5,434 swine. It has a number of manufacturing establishments, chiefly in Houston, the county seat.

HARRIS, James, an English philologist, born in Salisbury, July 20, 1709, died Dec. 22, 1780. He was educated at Oxford as gentleman commoner, and thence passed as a student of law to Lincoln's Inn. His father died when he was 24 years of age, leaving him a fortune, so that he abandoned the law, retired to his native town, and devoted himself to more congenial pursuits. He was elected to parliament for the borough of Christchurch in 1761, and filled that seat during the rest of his life. In 1762 he was appointed one of the lords of the admiralty, and in the following year a lord of the treasury, but went out of office with the change of administration in 1765. In 1774 he was appointed secretary and comptroller to the queen. In 1744 he published "Three Treatises: I. Art; II. Music, Painting, and Poetry; III. Happiness;" and in 1751 his famous work, "Hermes, or a Philosophical Inquiry concerning Universal Grammar," which has been considered a model of ingenious analysis and clear exposition, Lowth claiming for it that it is the best specimen of analysis since the time of Aristotle. In 1775 Harris published "Philosophical Arrangements," as part of a projected work upon the "Logic" of Aristotle. His "Philological Inquiries" was published after his death, in 1781. His collected works were published in 1792; a fine edition, with a biography, was published by his son, Lord Malmesbury, in 1801 (2 vols. 4to, London).

HARRIS, John, an English clergyman, born at Ugborough, Devonshire, in 1804, died in London, Dec. 21, 1856. He studied divinity in Hoxton Independent college, and became pastor of the Independent church in Epsom. When in 1850 it was determined to consolidate the various Independent colleges in and about the metropolis into one, he was chosen principal of the new institution, called New college, in which he was also professor of theology. While at Epsom he wrote his prize essay against covetousness under the title of "Mammon" (1836). Other works written for prizes were "Britannia" (1837), an appeal in aid of the objects of the British and foreign sailors' society, and "The Great Commission" (1842), an essay on Christian missions. His most important works are "The Pre-Adamite Earth" (1847), "Man Primeval" (1849), and "Patriarchy, or the Family, its Constitution and Probation" (1855).

HARRIS, Thaddeus William, an American naturalist, born in Dorchester, Mass., Nov. 12, 1795, died in Cambridge, Jan. 16, 1856. He graduated at Harvard college in 1815, studied medicine, and practised his profession at Milton Hill till 1831, when he was appointed librarian of Harvard college. For several years he gave instruction in botany and general natural history in the college, and he originated the Harvard natural history society for the students. He was chiefly distinguished as an entomologist. In 1837 he was appointed one of the commissioners for a zoological and botanical survey of Massachusetts, the result of which was his "Systematic Catalogue of the Insects of Massachusetts" appended to Prof. Hitchcock's report. In 1841 appeared his "Report on Insects Injurious to Vegetation," published by the legislature. It was reprinted in 1852, somewhat enlarged; and a new and enlarged edition, by Charles L. Flint, with engravings drawn under the supervision of Prof. Agassiz, by direction of the legislature, appeared in 1862.

HARRIS, Thomas Lake, an American reformer, born at Fenny Stratford, England, May 15, 1823. He was brought to America when four years old by his father, who engaged in mercantile pursuits in Utica, N. Y. By his mother's death and financial reverses he was thrown from boyhood on his own efforts for education and support. At an early age he exhibited strong religious tendencies and poetic imagination. At 17 he began to write for the press, and soon after became known through contributions to newspapers and periodicals. In his 21st year he renounced his inherited Calvinistic faith and entered the ministry of the Universalist denomination, settling at once over a parish in Minden, N. Y. After a few months, on account of failing health, he went to Charleston, S. C., whence in the following year he removed to New York to become pastor of the fourth Universalist society; but after one or two years he was again prostrated and resigned his charge, in which he was succeeded by the Rev. Dr. Chapin. In the ensuing year he took the position which he has since maintained of an independent religious and social teacher, and organized the "Independent Christian Society" in New York, to which he continued to minister till after the outbreak of spiritualism in 1850. He then joined a community at Mountain Cove, Va., and after a few months employed in spiritual investigations he preached and lectured in the principal cities of the Union till 1855. In philosophy a Platonist, in spiritual science agreeing with Swedenborg, and in sociology accepting the economical views of Fourier, he sought in these labors to turn the public interest in spiritualism in behalf of this larger and higher range of thought. In 1855 he resumed his ministry among his friends in New York, and established a periodical devoted to his religious and social doctrines. In March, 1857, as he affirms in his "Arcana of Christianity," he was sub-

jected to severe temptations from evil spirits, whom he saw plainly and talked with. The result of the conflict with these demons was that he triumphed over them and gained the power of internal respiration, so that now, as he says, "I inhale with equal ease and freedom the atmosphere of either of the three heavens, and am enabled to be present, without the suspension of the natural degree of consciousness, with the angelic societies, whether of the ultimate, the spiritual, or the celestial degree." In 1858 he visited England and Scotland, and preached and lectured several months each in London, Manchester, Edinburgh, and Glasgow. Returning in 1861, he retired to his farm in Amenia, Dutchess co., N. Y. Here he was followed by a few friends, interested in or experiencing the new respiration, and seeking to realize a purer social life. As his spiritual family enlarged he purchased property in the neighboring village of Amenia, organized a national bank, and engaged in milling and other branches of business at that place and elsewhere; and now the family grew into a society, since known as the "Brotherhood of the New Life." He returned to Europe in the interests of the brotherhood in 1866, and in 1867 removed to Portland, Chautauqua co., N. Y., where he purchased for his own account a tract of 1,000 acres suitable for vineyard and agricultural purposes, and adjoining farms of about the same extent for account of other members of the society. Among those who had joined him previous to this were Lady Oliphant and her son Mr. Laurence Oliphant, M. P., and several Japanese of distinction, one of whom is now a foreign minister, and another in high official rank in his own country. Members of the society who hold real estate cultivate it on their own account. No property is held in common. Mr. Harris's own estate affords a place of retreat and means of rest and recuperation to members of the fraternity in impaired health, or to those who visit him from Asia and Europe; while its cultivation gives employment to such of his friends as find in it a congenial pursuit; but nearly all the members of the brotherhood are engaged in active commercial, industrial, or diplomatic pursuits in their respective countries. The "Brotherhood of the New Life" has no written creed, covenant, or form of government. It is said that it numbers more than 2,000 members, mostly in Great Britain and on the continent, in India and Japan, and that it is held in its entirety simply by the principle of fraternal love, and by an inspiration working through internal respiration, and that its growth, since it never employs proselytism, is by means of its inherent vitality and assimilative power. They claim for this new breath that it descends through the heavens from the Divine Spirit, and that it replaces the former and natural mode of breathing by a respiration which is divine-natural, in fulfilment of the statement which Swedenborg alleges to have been made to him by the angels in the last century, that

the existing order of Christendom was in its last stages and should be followed by another resulting from a "new respiration, breathed through the heavens by the Lord." They believe that inmosty God dwells with all men, but that personally and corporeally all are *en rapport* with good and evil spirits; that self-love and self-indulgence corrupt and degrade the person till the divine likeness is effaced and the man becomes a devil; that salvation is neither by natural progression, nor philosophical self-culture, nor justifying faith, but that man only becomes free from his evils, and from the tyranny and inspiration of evil spirits, through self-renunciation and a life of unselfish labor for humanity; but that in this latter case both spirit and body may become regenerate and pure. They hold that God is Two-in-one, infinite in fatherhood and motherhood, and that all who become angels find their counterparts of sex and become two-in-one to eternity; hence they recognize in marriage not only a pure ordinance, but the symbol of the holiest of divine mysteries. They hold that the Christian church of the future will not be an ecclesiasticism, but a pure and free society, not communistic, but fraternal and coöperative. Mr. Harris's principal prose works are: "Wisdom of Angels" (1856); "Arcana of Christianity" (1857, 1866); "Truth and Life in Jesus" (1859); "Modern Spiritualism, its Truths and Errors" (1860); "Sermons and Lectures" (1860); "Millennial Age" (1860); "Breath of God with Man" (1866). His poetical works are: "Starry Heavens" (1853); "Lyric of the Morning Land" (1854); "Lyric of the Golden Age" (1856); "Regina" (1859); "Hymns of Spiritual Devotion" 1856-'8); "The Great Republic" (1866).

HARRIS, William, an American clergyman, born in Springfield, Mass., April 29, 1765, died Oct. 18, 1829. He graduated at Harvard college in 1786, was ordained priest in the Episcopal church in 1792, and took charge at once of the church and academy in Marblehead, Mass. In 1802 he became rector of St. Mark's church in New York, where he established a classical school. He was chosen in 1811 to succeed Bishop Moore as president of Columbia college, and for six years retained his rectorship in connection with this office. He was assisted in the duties of the presidency by Dr. J. M. Mason, under the title of provost, an office which was abolished in 1816; from which time until his death Dr. Harris devoted himself entirely to the college.

HARRIS, William Torrey, an American philosopher, born in Killingly, Conn., Sept. 10, 1835. He entered Yale college in 1854, but did not graduate. The degree of A. M. was conferred upon him by the college in 1869. In 1857 he went to St. Louis, and in the following year became a teacher in one of the public schools. Ten years later he was made superintendent of schools, a post which he still holds (1874). He was one of the founders of the philosophi-

cal society of St. Louis in 1866, and in 1867 established the "Journal of Speculative Philosophy," a quarterly magazine which he continues to edit, and to which he has contributed many philosophical articles of his own, besides translations of the principal works of Hegel. The "Journal" has also published translations from Leibnitz, Descartes, Kant, Fichte, and Schelling, and from recent German and Italian philosophers, and many remarkable papers on art. In 1874 Mr. Harris was elected president of the "National Teachers' Association."

HARRISBURG, a city, county seat of Dauphin co., Pennsylvania, and capital of the state, situated on the E. bank of the Susquehanna river, here spanned by a public and a railroad bridge, 95 m. W. by N. of Philadelphia; lat. 40° 16' N., lon. 76° 50' W.; pop. in 1850, 7,834; in 1860, 13,405; in 1870, 23,104, of whom 2,795 were foreigners. The river at this point is a mile wide, and is divided by an island in the middle. The city is handsomely built, and is surrounded by magnificent scenery. The state house, finely situated on an eminence near the centre, is a handsome brick building, 180 ft. long by 80 ft. wide, with a circular Ionic portico in front surmounted by a dome commanding a fine view. It was begun in 1819, and occupied for the first time on Jan. 28, 1822. There is a smaller building of similar design on each side of it, devoted to government uses. The county court house, in Market street, is a stately brick edifice, surmounted by a dome. The state lunatic asylum, N. of the city, was opened in 1851, and in 1874 had 408 inmates. The other principal public buildings are the market houses, county prison, eight large brick school houses, a fine masonic hall, and several churches. Front street, overlooking the river, affords the most attractive promenade in the city, and contains many of the finest residences. Harris park is a handsome public square, and at the intersection of State and Second streets is a monument erected in memory of the soldiers of the county who fell in the civil war. Harrisburg is surrounded by a fertile region, abounding in coal and iron ore, and has ample means of communication with Philadelphia, Baltimore, and the west by the Pennsylvania canal, and the Pennsylvania Central, the Cumberland Valley, the Northern Central, the Lebanon Valley, and the Schuylkill and Susquehanna railroads. The manufactures, particularly of iron, are extensive. The principal establishments are 10 iron foundries, 2 machine shops, a rolling mill, a manufactory of nails, 2 of steam engines, one each of files, cars, coaches, cement pipe, pottery, brooms, soap, and hose and belting, 4 of carriages, 2 of cigar boxes, a cotton mill, a knitting mill, 4 planing and saw mills, 2 tanning and currying establishments, and 6 breweries. The Lochiel iron company manufactures bar and railroad iron. There are six banks, with an aggregate capital of \$650,000. The city is divided into 9 wards, and is governed by

a mayor and a common council of 25 members. The streets are well paved and drained, and lighted with gas. Water is supplied from the river, by works erected at a cost of \$2,000,000, and having a capacity of 10,000,000 gallons a day. The taxable valuation of proper-

ty in 1874 was \$6,000,000; city debt, \$600,000. The public schools in 1872 numbered 51 (2 high, 15 grammar, and 34 primary), having 78 teachers and an average attendance of 2,339 pupils. There are also an academy, a female seminary, and an English and German



Harrisburg, from the west bank of the Susquehanna.

Catholic school. Four daily and eight weekly (two German) newspapers and two monthly periodicals are published. The state library contains 30,000 volumes. There are 32 churches, viz.: 4 Baptist, 1 Episcopal, 1 Evangelical, 1 Jewish, 6 Lutheran (2 German), 4 Methodist (1 Welsh), 4 Presbyterian, 2 Reformed (1 German), 2 Roman Catholic (1 German), 2 United Brethren, and 5 miscellaneous.—The first permanent white settlement on the site of Harrisburg was made about 1726, by an Englishman named John Harris, who, in December, 1733, obtained from the proprietaries of Pennsylvania a grant of 300 acres of land near his residence, and purchased of other grantees 500 acres adjoining. He carried on a considerable trade with the Indians of the vicinity. In 1753 the Penns granted to his son, John Harris, Jr., the right to establish a ferry over the Susquehanna, and the place was long known as Harris's Ferry. In 1785 the town was laid out, and it became the seat of justice of the new county taken from Lancaster and called Dauphin, after the French crown prince; the town also received, in honor of Louis XVI., the name of Louisbourg, but in 1791 it was incorporated as a borough under its present name. It became the capital of the state in 1812, and received a city charter in 1860.

HARRISON, the name of eight counties in the United States. **I.** A N. W. county of West Virginia, drained by the W. fork of Mononga-

hela river; area, 440 sq. m.; pop. in 1870, 16,714, of whom 655 were colored. It has a hilly surface and fertile soil, and abounds in timber, coal, and iron. The Parkersburg division of the Baltimore and Ohio railroad passes through it. The chief productions in 1870 were 83,473 bushels of wheat, 327,261 of Indian corn, 56,183 of oats, 26,028 of potatoes, 45,662 of wool, 276,955 of butter, and 16,901 tons of hay. There were 5,040 horses, 4,906 milch cows, 15,855 other cattle, 15,812 sheep, and 8,951 swine; 1 manufactory of boots and shoes, 1 of iron castings, 2 of machinery, 5 tanneries, 5 currying establishments, 3 flour mills, and 5 saw mills. Capital, Clarksburg.

II. A S. E. county of Mississippi, bordering on the gulf of Mexico, and drained by Biloxi and Wolf rivers and branches of the Pascagoula; area, 870 sq. m.; pop. in 1870, 5,795, of whom 1,427 were colored. The surface is level and mostly covered with pine woods, and the soil is light and sandy. The New Orleans, Mobile, and Texas railroad passes through it. The chief productions in 1870 were 9,345 bushels of Indian corn, 12,625 of sweet potatoes, and 98,750 lbs. of rice; value of live stock, \$78,135. There were 16 saw mills. Capital, Mississippi City. **III.** A N. E. county of Texas, bordering on Louisiana, bounded N. by Big Cypress bayou and Caddo lake, and S. by Sabine river; area, 964 sq. m.; pop. in 1870, 13,241, of whom 8,931 were colored. The surface is diversified

by prairies and forests, and the soil is fertile. Coal and iron ore are found on the Sabine river, and there are several mineral springs. The Texas and Pacific railroad passes through it. The chief productions in 1870 were 233,019 bushels of Indian corn, 23,004 of sweet potatoes, and 8,165 bales of cotton. There were 899 horses, 1,095 mules and asses, 2,396 milch cows, 3,953 other cattle, 2,463 sheep, and 8,269 swine. Capital, Marshall. **IV.** A N. E. county of Kentucky, drained by Licking river and its S. branch; area, 356 sq. m.; pop. in 1870, 12,993, of whom 2,378 were colored. The surface is diversified by hills and tracts of rich rolling land, the soil is fertile and well adapted for grazing, and blue limestone is abundant. The Kentucky Central railroad passes through it. The chief productions in 1870 were 61,669 bushels of wheat, 42,386 of rye, 719,315 of Indian corn, 85,914 of oats, 20,604 of potatoes, 281,704 lbs. of tobacco, 31,961 of wool, and 153,756 of butter. There were 5,966 horses, 1,924 mules and asses, 2,845 milch cows, 5,590 other cattle, 8,697 sheep, and 16,098 swine; 10 carriage factories, 1 woollen factory, 13 distilleries, 5 flour mills, and 2 saw mills. Capital, Cynthiana. **V.** An E. county of Ohio, drained by branches of the Ohio and Tuscarawas rivers; area, 420 sq. m.; pop. in 1870, 18,682. It has a hilly surface and a rich soil. Limestone and iron are found. The Pittsburgh, Cincinnati, and St. Louis railroad and Cadiz branch traverse it. The chief productions in 1870 were 155,688 bushels of wheat, 588,216 of Indian corn, 283,959 of oats, 67,996 of potatoes, 820,615 lbs. of wool, 616,628 of butter, and 31,652 tons of hay. There were 4,844 horses, 4,477 milch cows, 6,515 other cattle, 180,189 sheep, and 9,067 swine; 7 manufactories of carriages, 10 of clothing, 2 of woollen goods, 7 tanneries, 7 currying establishments, 2 planing mills, and 3 saw mills. Capital, Cadiz. **VI.** A S. county of Indiana, separated from Kentucky by the Ohio river, and bounded W. by Blue river; area, 478 sq. m.; pop. in 1870, 19,913. It has an uneven surface, broken by "knobs" and hills, and based partly on carboniferous limestone. It abounds in natural caverns, one of which, called Pitman's cave, extends more than 2 m. under ground. Near it is a remarkable spring 60 ft. in diameter, and several hundred ft. deep. The soil is mostly good. The chief productions in 1870 were 255,847 bushels of wheat, 507,072 of Indian corn, 171,700 of oats, 156,259 of potatoes, 37,403 lbs. of wool, 196,377 of butter, and 7,212 tons of hay. There were 6,155 horses, 5,226 milch cows, 5,633 other cattle, 15,769 sheep, and 29,139 swine; 16 manufactories of barrels and casks, 6 of furniture, 1 of tin, copper, and sheet-iron ware, 15 flour mills and 12 saw mills. Capital, Corydon. **VII.** A W. county of Iowa, separated from Nebraska by the Missouri, and crossed by Boyer and Soldier rivers and other streams; area, about 480 sq. m.; pop. in 1870, 8,931.

The surface is somewhat diversified, and the soil fertile. Timber is found along the streams. The Chicago and Northwestern and the Sioux City and Pacific railroads traverse it. The chief productions in 1870 were 194,591 bushels of wheat, 664,510 of Indian corn, 103,207 of oats, 42,167 of potatoes, 223,615 lbs. of butter, and 22,661 tons of hay. There were 3,451 horses, 4,202 milch cows, 7,027 other cattle, 5,222 sheep, and 9,274 swine; 2 flour mills, 4 saw mills, and 1 woollen factory. Capital, Magnolia. **VIII.** A N. W. county of Missouri, bordering on Iowa, and watered by affluents of Grand river; area, 754 sq. m.; pop. in 1870, 14,635, of whom 10 were colored. It consists in large part of prairies, and has much fertile soil near the rivers. The chief productions in 1870 were 109,571 bushels of wheat, 756,607 of Indian corn, 210,521 of oats, 55,400 of potatoes, 86,415 lbs. of wool, 20,075 of tobacco, 370,359 of butter, and 7,902 tons of hay. There were 7,781 horses, 5,989 milch cows, 12,308 other cattle, 31,609 sheep, and 31,893 swine; 2 flour mills, 7 saw mills, and 2 wool-carding and cloth-dressing establishments. Capital, Bethany.

HARRISON, Benjamin, an American statesman, one of the signers of the Declaration of Independence, born in Berkeley, Va., about 1740, died in April, 1791. He entered public life in 1764 as a member of the Virginia house of burgesses, of which he soon became one of the leaders. During the agitation of the stamp act question, the governor of Virginia unsuccessfully attempted to secure his support by offering him a seat in the executive council. He was a member of the first continental congress, and served as chairman of the board of war and on other important committees until the close of 1777, when he returned to Virginia. He was elected to the house of burgesses, over which he presided till 1782, when he was chosen governor. In 1785, after having been twice reelected governor, he returned to private life. He was a member of the state convention which met in 1788 to ratify the federal constitution, and at the time of his death of the state legislature. He was the father of William Henry Harrison.

HARRISON, John, an English mechanic, born at Faulby, Yorkshire, in 1693, died in London in 1776. He was the son of a carpenter, and in his youth worked in his father's shop. A taste for mechanical pursuits led him to study the construction of clocks, and in 1726 he effected improvements which insured much greater accuracy than had previously been attained in timepieces. In 1714 parliament offered prizes of £10,000, £15,000, and £20,000 respectively for a method of ascertaining longitude within 60, 40, or 30 miles. Mr. Harrison constructed a chronometer which was satisfactorily tested on a voyage in 1736, and by successive improvements on it secured the highest prize in 1767. His inventions, the gridiron pendulum, the going barrel, the compensation

curb, and the remontoir escapement, were considered the most remarkable in the manufacture of watches of the last century. (See **CLOCKS AND WATCHES.**)

HARRISON, John, an English regicide, executed in London in October, 1660. He was a colonel in the parliamentary army, and superintended the removal of Charles I. from Hurst castle to Windsor, Dec. 19-23, 1648. The king had been told that Harrison was appointed to assassinate him, and, struck with his soldierly appearance, told him his suspicion, when Harrison replied that the parliament would not strike the king secretly. On Jan. 19, 1649, he escorted Charles from Windsor to London for trial. He was appointed major general, and was one of a conference of the chief men at the house of the speaker of the commons, in 1651, to decide upon the policy of the government. When Cromwell was about to dissolve the long parliament, the same year, he told Harrison, who advised against haste. In 1653 he was considered by the Anabaptists as their leader. Upon the restoration, in 1660, he was executed with nine others.

HARRISON, William Henry, ninth president of the United States, born in Berkeley, Charles City co., Va., Feb. 9, 1773, died in Washington, April 4, 1841. He was the third and youngest son of Governor Benjamin Harrison. At the age of 19 years, with the commission of ensign, he joined the army employed first under St. Clair, and afterward under Wayne, against the western Indians, becoming aide-de-camp of the latter. In 1795 he was made captain and placed in command of Fort Washington, on the site of the present city of Cincinnati, laid out on grounds owned by John Cleves Symmes, whose daughter Capt. Harrison married. In 1797 he resigned his commission and was appointed secretary of the territory N. W. of the Ohio, from which in 1799 he was chosen a delegate to congress. The Northwestern territory having been divided, Harrison was appointed in 1801 governor of the new territory of Indiana, embracing the present states of Indiana, Illinois, Michigan, and Wisconsin. Almost the whole of it was then in possession of the Indians, with whom as superintendent he made several important treaties in which large cessions of territory were obtained. The agitation among the Indians caused by Tecumseh and his brother the prophet having resulted in hostilities, Harrison in the autumn of 1811 advanced against the prophet's town at the head of 800 men, partly regulars and partly volunteers. His camp at Tippecanoe was unsuccessfully attacked on the night of Nov. 7. The defeated Indians were at first inclined to treat, but the breaking out of the war with Great Britain made them again hostile. After Hull's surrender, Harrison was appointed, in September, 1812, to the command of the N. W. frontier, with a commission as brigadier general. It was not till the next year, by which time he was promoted to the rank of major general,

that he was able to commence active operations. Several mishaps grew out of the inexperience of his subordinate officers, but the victory of Perry on Lake Erie enabled him to recover from the British the American territory which they had occupied, and to pursue them into Canada, where on Oct. 5 they were totally routed in the battle of the Thames. A peace with the N. W. Indians soon followed. Not long after, in consequence of misunderstandings with Armstrong, the secretary of war, Harrison resigned his commission in the army. In 1816 he was elected from the Cincinnati district a member of congress, in which body he sat for three years. In 1819 he was elected a member of the state senate of Ohio, and in 1824 United States senator. He was appointed chairman of the military committee in place of Gen. Jackson, who had just resigned his seat in the senate. In 1828 he was appointed by President John Q. Adams minister plenipotentiary to Colombia, but was recalled immediately on Jackson's accession to the presidency in 1829. For several years after his return he took no active part in political affairs, but lived retired on his farm at North Bend on the Ohio, a few miles below Cincinnati, and was for 12 years clerk of the county court. In 1836, as the close of Jackson's second term of office drew near, the opposition were somewhat at a loss for a candidate for the presidency. The success of Gen. Jackson gave rise to the idea of adopting a candidate who had military reputation. Harrison, while in command of the N. W. department during the war of 1812, had enjoyed a high popularity in the west, and was now brought forward as a presidential candidate. He received 73 electoral votes, a greater number than Clay had obtained four years before, though Massachusetts, which now voted for Mr. Webster, then voted for him. The financial crisis which followed the election of Mr. Van Buren greatly strengthened the opposition. The prospect of defeating his reelection was very strong if the opposition could unite upon a candidate. Mr. Clay was again brought forward and strongly urged. Gen. Scott was also proposed. In the national convention which met at Harrisburg, Dec. 4, 1839, Gen. Harrison received the nomination. A very ardent and exciting canvass followed. On the part of the supporters of Harrison every means was employed to arouse the popular enthusiasm. Mass meetings and political processions were now first brought into general use, and this canvass marks an era in the style of conducting elections. The slur which had been cast upon Harrison that he lived in a "log cabin," with nothing to drink but "hard cider," was seized upon as an electioneering appeal. Log cabins became a regular feature in political processions, and "hard cider" one of the watchwords of the party. Harrison received 234 electoral votes to 60 for Van Buren. He was inaugurated president, March 4, 1841. His cabinet was judiciously

composed, and great expectations were formed of his administration; but within a month, and before any distinctive line of policy could be established, he died, after an illness of eight days, brought on, it was supposed, by fatigue and excitement incident to his inauguration.

HARRODSBURG, a town and the capital of Mercer co., Kentucky, situated on a small branch of Salt river, 8 m. S. W. of the Kentucky river, and 30 m. S. of Frankfort; pop. in 1870, 2,205, of whom 1,101 were colored. Built on high ground and surrounded by fine scenery, it is an attractive summer retreat, and enjoys a reputation for its mineral waters. The Harrodsburg springs were formerly among the most fashionable places of resort in the western states, and are still visited by invalids. They were purchased a few years ago by the United States government as the site of a military asylum, but this institution is not now in operation. An important trade is carried on in horses, cattle, and other live stock. The town contains a weekly newspaper, a national bank, and several factories. It is the seat of Daughters' college (Christian), founded in 1856, and having in 1873-'4 8 instructors, 140 students, and a library of 3,000 volumes. It is essentially a female normal school, and many of its graduates are engaged in teaching. Bacon college has been removed to Lexington, and merged in the Kentucky university. Harrodsburg is said to be the oldest town in Kentucky, the first cabin having been built in 1774 by Capt. James Harrod.

HARROGATE, or **Harrowgate**, a village of Yorkshire, England, 20 m. W. by N. of York; pop. in 1871, 10,829. It has chalybeate and sulphurous springs, and is the principal watering place in the north of England. It contains public baths, hotels, lodging houses, a theatre, promenade rooms, ball rooms, and libraries.

HARROW, or **Harrow-on-the-Hill**, a village of Middlesex, England, 10 m. N. W. of London; pop. in 1871, 10,867. It contains an ancient parish church having a lofty tower and spire, places of worship for Baptists and Methodists, and a free grammar school which was founded in 1571 by John Lyon, a wealthy yeoman of the parish. This school was originally intended for the gratuitous instruction of poor boys belonging to the parish of Harrow; but as the education is almost wholly classical, few boys belonging to the parish take advantage of it,

and it is now principally attended by the sons of the nobility and gentry, and is in high repute. Among the celebrated men who have been educated there are Sir William Jones, Dr. Parr, Lord Byron, and Sir Robert Peel. Harrow school chapel has been much improved



Harrow School.

since 1856, a new aisle being added from funds subscribed by the masters and the parents of the pupils, and a beautiful chancel erected at the expense of the head master, Dr. Vaughan.

HART. I. A N. E. county of Georgia, separated from South Carolina by the Savannah river, and watered by several of its small branches; area, about 350 sq. m.; pop. in 1870, 6,783, of whom 1,942 were colored. The surface is uneven. The chief productions in 1870 were 18,986 bushels of wheat, 112,656 of Indian corn, 11,566 of oats, 12,158 of sweet potatoes, and 1,320 bales of cotton. There were 871 horses, 1,522 milch cows, 2,335 other cattle, 3,437 sheep, and 4,529 swine, and 1 cotton factory. Capital, Hartwell. II. A central county of Kentucky, in the region called "the barrens," watered by Green river, which is here navigable by steamboats; area, 432 sq. m.; pop. in 1870, 13,687, of whom 2,192 were colored. The surface is diversified by small hills thinly covered with oak and other timber, and is perforated by many limestone caverns; the soil is fertile. The Louisville and Nashville railroad passes through it. The chief productions in 1870 were 81,923 bushels of wheat, 449,286 of Indian corn, 62,785 of oats, 2,315,212 lbs. of tobacco, 26,250 of wool, and 132,332 of butter. There were 3,801 horses, 2,830 milch cows, 3,513 other cattle, 13,865 sheep, and 22,249 swine. Capital, Mumfordsville.

HART, James McDougal, an American painter, brother of William Hart, born in Kilmarnock, Ayrshire, Scotland, in 1828. His parents having removed to Albany, N. Y., he commenced life as a coach painter at Troy, and was induced

by a natural taste for art to adopt the profession of a landscape painter. He went in 1851 to Düsseldorf, where he spent nearly a year under the instruction of Schirmer. He returned to Albany in 1852, and in 1856 removed to New York. In 1857 he was elected an associate of the academy of design, and in 1859 an academician. He is particularly noted as a painter of cattle and sheep. Some of his principal paintings are, "Woods in Autumn," "Moonrise in the Adirondacks," "Coming out of the Shade," and "On the March," a piece containing cattle and sheep.

HART, Joel T., an American sculptor, born in Clark co., Ky., about 1810. His education was restricted to a quarter's schooling, but he read diligently all the books that he could obtain. In 1830 he entered a stone cutter's shop in Lexington, and soon began to model busts in clay, making good likenesses of many influential persons, among whom were Gen. Jackson and Cassius M. Clay. The latter gave him his first commission for a bust in marble. The work was so satisfactory that the artist was commissioned by the "Ladies' Clay Association" of Virginia to execute a marble statue of Henry Clay, which now stands in the capitol square at Richmond. He went to Florence in 1849 to execute this order, but the work was delayed in consequence of the loss of his model by shipwreck and by other circumstances, and it was not till 1859 that the statue was shipped to the United States. Mr. Hart afterward made the colossal bronze statue of Henry Clay which now stands at the intersection of St. Charles and Canal streets in New Orleans. He still resides in Florence (1874), where he has executed many busts of eminent men and a number of ideal works. Among the latter are "Angelina," "Il Penseroso," and "Woman Triumphant."

HART, John, a signer of the Declaration of Independence, born in Hopewell township, N. J., in 1708, died there in 1780. He was the son of a farmer, and spent the greater part of his life on his own farm near Trenton. He was several times a member of the provincial congress of New Jersey, and was prominent especially in legislation for local improvements. On June 21, 1776, he was elected, with four others, to the continental congress, to fill the vacancy caused by the resignation of the New Jersey delegation, who, elected the previous February, were unwilling to assume the responsibility imposed by Lee's resolution. Of the number who resigned was John De Hart, who has frequently been confounded with the signer of the Declaration. In 1777 and 1778 John Hart was a prominent member of the New Jersey council of safety. When the state was invaded by the British, his farm was laid waste and every effort made to capture him. He left his family and wandered through the woods, constantly hunted, and never venturing to sleep twice in the same house. The capture of the Hessians at Trenton made it safe

for him to return to his farm, where he passed the remainder of his life.

HART, John Seely, an American author, born at Stockbridge, Mass., Jan. 28, 1810. His family removed to Pennsylvania, finally settling near Wilkesbarre. He graduated at Princeton, N. J., in 1830, and after teaching for a year at Natchez, Miss., he became in 1832 tutor and in 1834 adjunct professor of ancient languages at Princeton, where from 1836 to 1841 he had charge of the Edgehill school. From 1842 to 1859 he was principal of the Philadelphia high school, and from 1863 to 1871 of the New Jersey state normal school at Trenton. In 1872 he became professor of rhetoric and of the English language at Princeton. He has contributed largely to periodicals, and edited several journals and illustrated annuals. Besides some text books and religious works, he has published "Class Book of Poetry" and "Class Book of Prose" (1844), "Spenser and the Fairy Queen" (1847), "Female Prose Writers of America" (1851), "In the School Room" (1868), "Manual of Composition and Rhetoric" (1870), "Manual of English Literature" (1872), "Manual of American Literature" (1873), and "Short Course in Literature, English and American" (1874).

HART, Solomon Alexander, an English painter of Jewish descent, born in Plymouth in April, 1806. He commenced his career by painting miniatures, but in 1828 turned his attention to historical subjects, and at once achieved a reputation by some scenes from the Jewish ceremonial. He next painted scenes from Scott and Shakespeare, and again, between 1845 and 1850, recurred to Jewish subjects. He has also shown a strong partiality for subjects illustrating the ceremonials of the Roman Catholic church. In 1840 he became an academician, and in 1854 succeeded Leslie as professor of painting in the royal academy, to which in 1865 he was appointed librarian.

HART, William, an American landscape painter, born in Paisley, Scotland, in 1823. He came with his parents to America in 1831, and settled in Albany, N. Y. In his youth he was employed in coach painting in Troy, and soon gave evidence of great ability in landscape and portrait painting. In 1848 he exhibited some of his works at the national academy of design, and they were favorably received. In 1850 he revisited Scotland, and spent three years there in study, settling in New York city on his return. In 1856 he was made an associate of the national academy, and two years later an academician. Mr. Hart is a successful teacher of his art as well as a popular painter. He was for some time president of the Brooklyn academy of design. Among his principal pictures are "The last Gleam," "The Golden Hour," "Sunset from Dark Harbor, N. B.," "Opening in the Elands" (a coast scene), and "Up in the Glen, White Mountains." He is especially distinguished for his numerous representations of American au-

turn scenery. He was one of the first to encourage the establishment of the American water-color society, and for three years was its president. His water-colors as well as his oil paintings are remarkable for the beauty of their skies.

HARTE, Francis Bret, an American author, born in Albany, N. Y., Aug. 25, 1839. His father, who was a teacher in a girls' seminary, died when he was very young. In 1854 Bret went to California, where for three years he wandered about among the mining camps, digging for gold, teaching school, and finally acting as an express messenger, but meeting with very little pecuniary success in any of these occupations. In 1857 he went to work in San Francisco as a compositor in the office of the "Golden Era." To this journal he contributed sketches of California life, many of which he himself put into type. After a time he was transferred to the editorial room, and still later he became editor of the "Californian," a literary weekly. In 1864 he was appointed secretary of the United States branch mint in San Francisco, which office he held for six years. Several of his short poems, contributed to San Francisco papers during this time, were widely copied and universally admired. Among them are "The Society upon the Stanislaw," "The Pliocene Skull," and "John Burns of Gettysburg." In July, 1868, the "Overland Monthly" was commenced, with Harte as its editor. To the August number he contributed "The Luck of Roaring Camp," a story of mining life idealized, which marks the beginning of his highest work as a writer. In January, 1869, appeared in the same magazine "The Outcasts of Poker Flat," more realistic and in some respects more artistic than its predecessor. These were followed by numerous other stories in the same vein, but none of which have been quite so successful. In September, 1870, appeared his humorous poem entitled "Plain Language from Truthful James," popularly known as "The Heathen Chinee," which was very widely copied and quoted, and of which several illustrated editions and a facsimile of the original manuscript have been published. About this time he was appointed professor of recent literature in the university of California; but in the spring of 1871 he resigned that chair, as well as the editorship of the "Overland," and visited the Atlantic cities, fixing his residence at New York. His "Condensed Novels," originally contributed to the "Californian," in which he parodied the styles of the leading writers of fiction, were collected and published in New York in 1867 (new ed., Boston, 1871). His other independent publications are: "Poems" and "Luck of Roaring Camp and other Sketches" (Boston, 1870); "East and West Poems" and "Poetical Works," illustrated (1871); "Mrs. Skaggs's Husbands" (1872); and illustrated editions of single poems. Since 1871 he has been a frequent contributor to the "Atlantic Monthly" and other periodicals.

HARTE, Walter, an English author, born about 1700, died in Bath in 1774. He was educated at Oxford, took orders, and, after establishing a reputation as a preacher, became vice principal of St. Mary's hall, Oxford. He travelled some years on the continent as tutor to the son of Lord Chesterfield, and was afterward appointed canon of Windsor. He early formed an intimacy with Pope, whose style he imitated. In 1727 he published a volume of "Poems on several Occasions;" in 1730 an "Essay on Satire," in 1735 on "Reason," and in 1764 on "Husbandry." His principal work is the "History of the Life of Gustavus Adolphus" (2 vols. 4to, London, 1759; 2 vols. 8vo, corrected and improved, 1763; new ed., 1807), which was translated into German, with notes, by J. G. Böhme. He left unfinished in manuscript a "History of the Thirty Years' War."

HARTEBEEST. See ANTELOPE.

HARTFORD, a N. county of Connecticut, bordering on Massachusetts, divided into two unequal parts by the Connecticut river, and watered by Farmington, Mill, Podunk, Scantic, and other rivers; area, 750 sq. m.; pop. in 1870, 109,007. The surface is much diversified, part of the river valleys being alluvial and subject to inundation, while other portions of the county are hilly and even mountainous. Most of the soil is fertile and highly cultivated; the E. part is famous for excellent dairy farms. The Connecticut river is navigable by sloops to Hartford, and by small steamboats through the county, which is also intersected by several railroads. The chief productions in 1870 were 6,458 bushels of wheat, 69,387 of rye, 217,502 of Indian corn, 119,335 of oats, 450,158 of potatoes, 1,301,352 lbs. of butter, 103,406 of cheese, 5,830,209 of tobacco, 25,925 of wool, and 95,615 tons of hay. There were 7,062 horses, 16,657 milch cows, 5,742 working oxen, 13,233 other cattle, 8,009 sheep, and 9,645 swine. There were 1,031 manufacturing establishments, with an aggregate capital of \$21,259,828; annual value of products, \$35,039,324. The most important were 7 manufactories of agricultural implements, 18 of carriages, 17 of clock cases and materials, 3 of clocks, 72 of clothing, 4 of cotton goods, 6 of cotton thread, &c., 6 of cutlery, 5 of axes and edge tools, 3 of firearms, 1 of gunpowder, 34 of hardware, 9 of hosiery, 23 of iron castings, &c., 26 of machinery, 27 of paper, 7 of plated ware, 21 of saddlery and harness, 3 of silk goods, 61 of tobacco and cigars, 10 of wood work, 12 of woollen goods, 36 of bricks, 12 of furniture, 30 flour mills, 2 planing mills, 26 saw mills, 3 bookbinderies, and 12 printing establishments. Capital, Hartford.

HARTFORD, a city in the town of the same name, seat of justice of Hartford co., and capital of Connecticut, the second city in the state in point of population, situated on the W. bank of the Connecticut river, at the head of sloop navigation, 50 m. by the river from Long Island sound, 33 m. N. N. E. of New Haven, 100 m.

N. E. of New York, and 95 m. W. S. W. of Boston; lat. $41^{\circ} 45' 59''$ N., lon. $72^{\circ} 40' 45''$ W. The town extends $5\frac{1}{2}$ m. N. and S. and $3\frac{1}{2}$ m. E. and W., embracing about $16\frac{1}{2}$ sq. m. The city comprises 10 sq. m., and is about $3\frac{1}{2}$ m. long from N. to S., with an average breadth of 3 m., the width near the centre, however, being less than 2 m. It is intersected by Park river, which is spanned by 11 bridges, and is bounded W. by the N. and S. forks of that stream. A bridge across the Connecticut, 1,000 ft. long, connects it with East Hartford. The city is laid out with considerable regularity, part of the streets running nearly parallel to the river, and others crossing them E. and W. Main street, which extends from N. to S. through the principal portion of the city, is the great

thoroughfare, and the seat of the principal retail trade. It is broad, and for more than a mile presents an almost unbroken range of brick and stone edifices. On this street are many of the principal public buildings and churches. State and Commerce streets are also the seats of a large and active business. Asylum street, extending W. to the railroad depot, is filled by large brick and freestone edifices, and is the seat of a very extensive and heavy business. In the outskirts are many tasteful and elegant residences; and the city, as a whole, is exceedingly well built. The state house, erected in 1794, is a handsome Doric edifice containing the legislative apartments and several law courts. In the senate chamber is an original painting of Washington



New State House at Hartford, Conn.

by Stuart. On the E. side of the state house square a building is in course of construction for the accommodation of the post office, United States courts, &c., to cost about \$300,000. The city hall, in the Grecian style, the state arsenal, the opera house, and the Union railroad depot, are among the finest of the other public edifices. The city park, embracing 46 acres, is beautifully situated in a bend of Park river, S. of the depot, and contains a fine bronze statue of Bishop Brownell and a statue of Gen. Putnam. Here the new state house, of marble, in the modern Gothic style, is in course of construction (1874). It is to be 300 ft. long by 200 ft. broad in the widest part, and 250 ft. high to the top of the dome, which is 87 ft. above the roof. Besides capacious

chambers for the two houses of the legislature, it will contain rooms for the supreme court and the state library. It is to be completed in May, 1876, and will cost about \$1,500,000. Besides the state house and city parks, there are two other public squares. Of the seven cemeteries, the most noteworthy is Cedar Hill in the S. W. part of the town, comprising 268 acres. The population of the town has been as follows: in 1790, 4,090; in 1800, 5,347; in 1810, 6,003; in 1820, 6,909; in 1830, 9,789; in 1840, 12,793; in 1850, 17,966; in 1860, 29,152; in 1870, 37,743, and of the city 37,180, of whom 10,817 were foreigners. The number of families was 7,427; of dwellings, 6,688.—The Connecticut river is open from about the middle of March to the middle of December.

during which time steamers run daily to New York and different points on the river, and in summer to various watering places on Long Island sound. There are also lines of steamers to Philadelphia and Baltimore, and packet lines to New York, Boston, Albany, Philadelphia, and other points. Railroad communication with New York and the principal places in New England is furnished by the New Haven, Hartford, and Springfield, the Hartford, Providence, and Fishkill, the Connecticut Valley, and the Connecticut Western lines; while local travel is accommodated by street cars, by omnibus to West Hartford, and by stages to the neighboring towns. Hartford has an active trade with the surrounding country, and carries on an extensive wholesale business with the west and south. The tobacco crop of the immediate vicinity is mostly sold here. The manufactures are varied and extensive, embracing iron and brass foundry products, steam engines and boilers, screws, saddlery hardware, carriage hardware, sewing machines, files, water wheels, forgings, wire, steel, machinists' tools, plumbers' materials, lawn mowers, eyelets, stone ware, britannia ware, silver-plated ware, gold pens, spectacles, organs, carriages, sash, doors, and blinds, woollens, rag carpets, envelopes, saddlery and harness, beer, gin, soap for fulling and scouring, cigars, fertilizers, &c. Three companies are engaged in the manufacture of firearms, Sharps' rifles and Colt's pistols being manufactured here. The Colt company has a capital of \$1,000,000, and possesses works and grounds covering 123 acres diked in from the river. Cheney brothers, an incorporated company, with a capital of \$1,000,000, manufacture silk goods and sewing silk; their principal mills are in South Manchester. The aggregate value of the manufactures for 1873 was about \$10,000,000. Including the New York and New England railroad company, with a capital of \$20,000,000, there are 103 incorporated companies in Hartford, having an aggregate capital of \$37,740,300, of which about one half are manufacturing companies, 8 or 10 are mining companies, and the rest are transportation companies, benevolent associations, &c. Book publishing is extensively carried on, 11 firms being engaged in the business. The greater part of the books published here are sold by subscription through agents, who are employed in all parts of the country. The city contains 14 hotels. There are 10 national banks, with an aggregate capital of \$6,562,800; 2 state banks, with \$650,000 capital; 5 savings institutions, with deposits, Jan. 1, 1873, amounting to \$10,041,600 65; and 3 trust companies, with a capital of \$650,000. The deposits of "the society for savings," incorporated in 1819, alone amounted to \$7,020,544 54. The insurance business is proportionally far more extensive than that of any other city of the United States, and has ramifications in all parts of the country. The number of

fire insurance companies is 8, having an aggregate capital of \$7,100,000, besides 2 mutual companies, with cash assets, Jan. 1, 1873, amounting to \$152,341 18. The oldest company is the Hartford, incorporated in 1810, and having a capital of \$1,000,000. The *Ætna*, with a capital of \$3,000,000, was incorporated in 1819, and in 54 years paid losses to the amount of \$39,000,000. There are 8 life insurance companies (3 mutual), a life and accident, and an accident insurance company, having gross assets, Jan. 1, 1873, to the amount of \$78,330,201. The Connecticut mutual company, incorporated in 1846, had nearly \$35,000,000 assets; the *Ætna*, over \$17,500,000; the Connecticut general, about \$10,800,000; and the Phoenix mutual, over \$8,000,000. The aggregate assets of the banking and insurance companies at the beginning of 1874 were over \$135,000,000.—The city is divided into 7 wards, and is governed by a mayor holding office for two years, a board of aldermen of 14, and a common council of 28 members. One alderman is elected annually from each ward for two years; the councilmen hold office one year. The recorder holds the city court, and the police judge, with an associate, the police court. The police force consists of 40 men. A paid fire department was organized in 1864; it comprises six steam engines, one hook and ladder, and two hose companies. A fire alarm telegraph is in operation, with 35 alarm boxes, and there are 261 hydrants and 5 reservoirs. Works were erected in 1855 (still maintained to meet any emergency) for pumping water from the Connecticut river, which supplied the city till 1867, when the new works at West Hartford went into operation. These works furnish water from a stream in that town to two reservoirs, one having a capacity of 165,000,000 and the other of 229,000,000 gallons, whence it is distributed through nearly 54 m. of mains. The total cost of apparatus for supplying the city with water to March 1, 1873, was \$1,065,826. The streets are well paved and drained, and lighted with gas. The ordinary receipts into the city treasury for the year ending April 1, 1873, amounted to \$638,691 72; the ordinary expenditures, including \$100,000 for the purchase of the Trinity college grounds, were \$648,196 16; total receipts, \$1,160,115 05; total expenditures, \$1,157,793 89. The floating debt was \$221,404; funded debt, \$1,986,000. The sinking fund amounted to \$161,167. The grand list, or assessed valuation of the town, in 1860, was \$24,813,190; in 1865, \$36,948,305; in 1870, \$44,509,427; in 1872, \$45,676,497. Sessions of the United States circuit and district courts are held here annually.—The benevolent organizations of Hartford are numerous. The American deaf and dumb asylum was chartered in 1816. The main building is 130 ft. by 50, and four stories high. In 1873 the asylum had 18 teachers, 280 pupils, and a library of 2,500 volumes. (See **DEAF AND DUMB**.) The Connecticut retreat for the in-

sane, chartered in 1824, is situated on a commanding eminence just outside the city, surrounded by about 17 acres of ground pleasantly laid out in gardens and walks. The main edifice is of freestone plastered over with cement. The number of officers and attendants, Jan. 1, 1874, was 32; of patients, 139. The Hartford hospital was incorporated in 1854; the buildings with the grounds, 7 acres in extent, cost \$188,495 60; the hospital has accommodations for 100 patients, and possesses a permanent fund of \$153,500. The Hartford orphan asylum was established in 1833. Among other charitable organizations are the Hartford dispensary, the city missionary society, the Connecticut home missionary society, the Connecticut Bible society, and the missionary society of Connecticut, organized in 1798, "to Christianize the heathen in North America, and to promote Christian knowledge in new settlements in the United States." There are 90 unincorporated societies for benevolent, social, and other purposes, including 10 lodges of freemasons, 3 of odd fellows, and 20 temperance societies. The county jail, situated in Pearl street, has 96 cells. A new building is in course of erection further N. Among the educational institutions, the most prominent is Trinity college (Episcopal), founded in 1823, and having in 1873-'4 17 professors and instructors, 94 students, and a library of 15,000 volumes. The buildings, comprising three stone halls, called respectively Seabury, Jarvis, and Brownell, occupy (1874) a site on the W. side of Trinity street, adjacent to the city park. The grounds, however, have been sold to the city, the trustees reserving the right to use them until April, 1877, with the exception of Brownell hall, a portion of which has been demolished to make room for the new state house. A new site for the college, about a mile south of the present one, has been purchased. (See TRINITY COLLEGE.) The theological institute of Connecticut (Congregational) was chartered in 1834, and in 1873-'4 had 3 professors, 18 students, and a library of 7,000 volumes. The Hartford female seminary, founded in 1823, had in 1872 3 instructors and 123 pupils. There are 13 select schools. The town is divided into 10 school districts. The number of public school houses in 1873 was 16, containing 105 rooms and 5 halls; number of teachers, 128; children of school age (4 to 16), 9,138; whole number registered, 6,905; average attendance, about 4,000. The total expenditure for school purposes was \$171,814 46, of which \$91,674 85 was for teachers' wages. The two evening schools had 10 teachers and 501 pupils. The high school was established by vote of the town in March, 1847, and the first building was completed in December of that year. A new building, one of the finest school edifices in the country, was erected in 1869 on a handsome site a short distance S. W. of the union depot. It is 100 by 85 ft. in its external dimensions, and consists of two sto-

ries surmounted by a Mansard roof, with a raised basement. On the N. E. corner is a tower 120 ft. high, containing a clock and an observatory, and on the S. E. corner is another tower 68 ft. high. It was constructed of brick and stone, at a cost of about \$102,000, and will accommodate 409 scholars. The number of teachers in 1873 was 15; of pupils, 404. The number of volumes in the school libraries is about 3,000. The schools are under the supervision of a board of 9 visitors, besides which there is a committee for each district and the high school. The Hartford grammar school, the oldest educational institution in the state, was first endowed with a gift of land by William Gibbins in 1655, and about 10 years afterward received a considerable sum from the estate of Governor Edward Hopkins. It was incorporated in 1798. The scholars must pursue a classical course of study. Tuition is free. Since the organization of the high school, the grammar school has practically formed part of the classical department of that institution, though governed by its own board of trustees. There are 4 daily and 8 weekly newspapers, and 3 monthly periodicals, of which one is published by the students of Trinity college. The Wadsworth athenaeum, in Main street, is a castellated granite building, 100 ft. long by 80 ft. deep in the centre and 70 ft. deep on the wings, with central towers 70 ft. and corner buttresses 56 ft. high. Its cost, over \$60,000, was defrayed by the contributions of citizens. In this building are the reading room and library (containing 23,000 volumes) of the young men's institute; the rooms of the Connecticut historical society, which possesses a library of 16,000 volumes; the Watkinson library (27,000 volumes); and a gallery of valuable paintings and statuary. The state library contains 12,000 volumes. The Connecticut school of design was chartered in 1872. There are 26 churches, of which 11 are in Main street within a distance of a mile, and 7 chapels. The number of religious societies is 40, viz.: 5 Baptist, 1 Catholic Apostolic, 1 Church of Christ, 12 Congregational, 8 Episcopal, 2 Jewish, 4 Methodist, 1 Presbyterian, 2 Roman Catholic, 1 Second Advent, 1 Spiritualist, 1 Unitarian, and 1 Universalist. Besides the Sunday schools connected with the churches, there are 3 mission Sunday schools, with 60 teachers, 470 pupils, and libraries containing 1,000 volumes. The corner stone of a Roman Catholic cathedral to be erected on Farmington avenue was laid in 1873.—Hartford was first settled in 1635 by emigrants from Newtown (now Cambridge), Mass., and from Dorchester and Waretown, many of whom had come originally from Braintree, England. The present locality of Hartford was called by the Indians Suckiangu. The first settlers named it Newtown; but in 1637 it was formally called Hartford, after Hertford, England, the birthplace of the Rev. Samuel Stone, one of the first pastors of the settlement. In 1633 the Dutch had erected a

fort on Dutch point, at the confluence of the Park and Connecticut rivers, within the present limits of Hartford; but in 1654 they were dispossessed by an act of the general court, and the new colony came entirely into the hands of the English. Among the early settlers were a number who had been persons of eminence and affluence in England, and who were held in high honor through all the New England settlements, many of whom were founders of families yet prominent in the city. The first town organization admitted inhabitants, and even temporary residents, only by vote of the town meeting. There was a public market semi-weekly, and a public fair twice every year. The first town meeting was held in 1635, and the first general court of Connecticut in 1636. The first church came ready organized from Cambridge, with its pastors, Hooker and Stone; and its first house of worship was erected in 1638. The first war was the Pequot war in 1637, for which Hartford contributed 43 out of 90 men, including commander and chaplain, besides a large share of provisions, equipments, &c. In 1639 a constitution for the government of the colony was formed. (See CONNECTICUT, vol. v., p. 260.) A school was in operation in 1638, and in 1643 £16 a year was voted to the teacher. A house of correction was in operation in 1640; the first inn was ordered by the general court and established in 1644. In 1650 the first code of laws was drawn up, chiefly by Roger Ludlow, which reduced the number of capital offences from 160, under English law, to 15. In 1687 the independent spirit of the colony was shown by their quiet but determined resistance to Andros, in his attempt to take away the charter of 1662, when, according to current accounts, the lights in the council chamber were all in an instant extinguished, and the charter seized and carried off in the dark, and hid in the famous "charter oak." (See ANDROS, SIR EDMUND.) In 1764 the first printing office was set up by Thomas Green. In 1775 a patriotic and enterprising committee met and made arrangements for raising men and money, which resulted in the taking of Ticonderoga. In 1784 the city was incorporated; in 1792 the first bank and first charitable society were established. From the union of the colonies of Connecticut and New Haven in 1665 till 1701 the legislature met in Hartford; between the latter date and 1818 one stated session was held in Hartford and one in New Haven each year; and from 1819 to 1874 there was an annual session at those places alternately. In 1875, by virtue of a constitutional amendment ratified by a popular vote in 1873, Hartford is again to become the sole capital.

HARTFORD CONVENTION, an assemblage of delegates from the New England states which met at Hartford, Dec. 15, 1814. The war between the United States and Great Britain, which began in 1812, was from the first distasteful to the majority of the people of New

England, who regarded it as unnecessary and impolitic, and who had suffered from it immense losses by the destruction of their commerce and their fisheries. They regarded the war as a mere party measure of the democrats, and as federalists they had earnestly and persistently opposed it. In February, 1814, a committee of the Massachusetts legislature made a report on public affairs, in which they declared that, in their opinion, the constitution of the United States had been violated by the federal government, and that still worse measures were likely to follow; and they suggested the appointment of delegates to meet such as might be appointed by the legislatures of other states "for the purpose of devising proper measures to procure the united efforts of the commercial states to obtain such amendments or explanations of the constitution as will secure them from future evils." The defence of the New England coast was neglected by the federal government, and the British were beginning to attack it with vigor. Stonington in Connecticut was bombarded, Castine and all Maine east of the Penobscot taken possession of, while a rumor spread that Massachusetts was to be invaded by a formidable force. Another committee of the Massachusetts legislature reported in October, 1814, that, in the position in which that state stood, no choice was left her between submission to the enemy, which was not to be thought of, and the appropriation to her own defence of those revenues derived from her people which the general government had hitherto thought proper to expend elsewhere. The committee also recommended a convention of the New England states; and their report being adopted by the legislature by a vote of three to one, a delegation of 12 men of the highest reputation, with George Cabot, William Prescott, and Harrison Gray Otis at their head, was appointed. A circular letter to the other New England states called upon them to meet in convention "to devise means of security and defence which may be consistent with the preservation of their resources from total ruin, and adapted to their local situation and mutual relations and habits, and not repugnant to their obligations as members of the Union." Connecticut and Rhode Island responded to this invitation, the former by appointing seven, and the latter four delegates. Two delegates appeared from New Hampshire, and one from Vermont, not sent by these states, but by separate counties. When the convention assembled they chose George Cabot president, and Theodore Dwight secretary. For 20 days the convention sat with closed doors, and on their adjournment embodied the result of their deliberations in a report addressed to the legislatures which they represented. This manifesto was moderate in tone and patriotic in sentiment, expressing strong affection for the Union and the greatest aversion to violent or unconstitutional opposition to legal authority. It point-

ed out, however, the dangers impending over New England from the alleged usurpations of the general government and from the foreign enemy. In the power over the militia claimed for the general government; in the filling up of the ranks of the regular army by conscription; in authorizing the enlistment of minors without the consent of their parents or guardians, thus invalidating contracts, the report maintained that the federal constitution had been disregarded in a way that demanded from the individual states firm and decided opposition. The convention recommended to the legislatures of the states for which it spoke the adoption of such measures as might be necessary effectually to protect their citizens from the operation of the acts passed by congress containing provisions subjecting the militia and other persons to forcible drafts, conscriptions, or impressments not authorized by the constitution of the United States. It recommended also an immediate application to the federal government by the New England states for authority to combine their forces for their defence against the British, and to appropriate for the same purpose a reasonable amount of the taxes levied upon them. Finally, it proposed several amendments to the federal constitution, among which were: basing representation on free population; making the president ineligible for a second term; disqualifying persons of foreign birth to hold office; limiting embargoes to 60 days; requiring a two-thirds vote in congress to admit new states, to interdict commercial intercourse, to declare war, or to authorize hostilities, except in cases of invasion. These questions had arisen during the hostilities with Great Britain, and the news of the negotiation of the treaty of peace at Ghent, which arrived soon after the adjournment of the convention, put a practical stop to their discussion. Congress, however, which was then in session, settled some of them by an act regulating the employment of state troops by the federal government in a satisfactory manner.—The holding of the Hartford convention and its supposed treasonable designs caused a great outcry from the democratic party, and excited much alarm and apprehension at Washington. The government stationed Major Jessup, a Kentucky officer of distinction, at Hartford with a regiment of troops to repress any sudden outbreak; but after the most careful investigation, this officer reported to his superiors at Washington that the convention would confine itself to complaints, remonstrances, and an address to the people, and that there was no reason to apprehend any treasonable action. The state department, however, had a correspondent who pretended to be in the confidence of the late British consul at Boston, and to have learned from him or from his papers the existence of a committee of New England royalists, who intended to establish the kingdom of New England with the duke of Kent as its sovereign. The

chief clerk of the state department was sent to Boston to investigate this matter, but could discover no trace of the pretended committee. The imputation of treasonable designs to the Hartford convention continued until a recent period, and resulted in excluding from political power in the nation almost every man implicated in its doings. It was also one of the chief causes which destroyed the federal party. It is now, however, almost universally conceded that the Hartford convention was guiltless of any designs which could justly be considered treasonable.—See "History of the Hartford Convention," by Theodore Dwight (Boston, 1833).

HARTLEPOOL, a town, parliamentary borough, and seaport of Durham, England, on a small peninsula N. of the estuary of the Tees, 17 m. S. E. of Durham, with which it is connected by railway; pop. in 1871, 39,969. The peninsula or headland, on which stands the old town, partially encloses a fine harbor which is safe and easy of access. The newer portion of the town, called West Hartlepool, is on the opposite or S. side of the harbor, which is about a mile wide. The old town was rechartered in 1850, and has since been greatly improved. It contains three churches, including the ancient parish church of St. Hilda, and three dissenting chapels, a fine new borough hall, a large market, a mechanics' institute, a theatre, and water works. There are iron mills, puddling furnaces, foundries, ship yards, and breweries; the fisheries are considerable; and there is a large commerce, principally in exporting coal and importing timber. West Hartlepool, which owes its existence to its fine docks, has wholly grown up since the first one was constructed, in 1847. It is well paved, lighted with gas, has large water works, and contains six churches and chapels, a theatre, town hall, mechanics' institute, and market house. There are large ship yards, foundries, locomotive works, saw mills, and brick yards, and 76 acres of dockage and three miles of quays. The harbor is defended by fortifications and has two light-houses. The parliamentary borough, constituted in 1867, is called the Hartlepoons.

HARTLEY. I. David, an English philosopher, born in Armley, Yorkshire, Aug. 30, 1705, died in Bath, Aug. 25, 1757. He was educated at Jesus college, Cambridge, of which he became a fellow, was destined to the church, but had scruples about subscribing the XXXIX. articles, and therefore studied medicine, which he practised with success at London, Bath, and other places. All records agree in extolling his personal character. His society was sought by the most distinguished literary men of his time. At the age of 25 he began the composition of his great work, "Observations on Man, his Frame, his Duty, and his Expectations," which was published after a labor of 18 years (2 vols., London, 1748-'9). His theory of sensation, grounded on an anatomical inspection of the nervous system, is historically curious as

perhaps the first attempt to explain psychological phenomena on physiological principles. According to him, the white medullary substance of the brain, spinal marrow, and the nerves proceeding from them, is the immediate instrument of sensation and motion. External objects excite vibrations in the medullary cord, which are continued by a certain elastic ether. Connected with this theory are other doctrines, especially that of association, which gave to Dr. Hartley a reputation as one of the most ingenious metaphysicians of the 18th century. When a sensation has been frequently experienced the vibratory movement from which it arises acquires a tendency to repeat itself spontaneously. Ideas are but these repetitions or relics of sensation, and in their turn recall other ideas. By the development of the law of association, and chiefly by the law of transference, he accounts for all the phenomena of the mental constitution. In many cases, the idea which is the link of association between two other ideas comes to be disregarded, though the association itself remains. Thus the idea of money is connected with that of pleasure by the conveniences which wealth may supply; but the miser takes delight in money without thinking of these conveniences. In this way Hartley accounts for almost all the human emotions and passions. An edition of the work, by his son, with notes from the German of H. A. Pistorius, was published in 1791 (3 vols., London). **II. David**, son of the preceding, born in 1729, died in Bath in 1813. As member of parliament for Kingston-upon-Hull, he steadily opposed the war with the American colonies. He was one of the plenipotentiaries appointed to treat at Paris with Dr. Franklin, in whose correspondence, published in 1817, some of his letters appear. He was an early promoter of the abolition of the slave trade, and exhibited his scientific knowledge in several useful inventions.

HARTMANN, Eduard von, a German philosopher, born in Berlin, Feb. 23, 1842. He was educated at the gymnasium in Berlin, and subsequently at the school of artillery. He became an officer in 1861; but having hurt his foot accidentally in the following year, and an incurable disease setting in, he has since been almost entirely confined to his room. Devoting himself to literary pursuits, he has published several philosophical works, and among them *Die Philosophie des Unbewussten* (Berlin, 1869; 5th ed., 1879), by which he has gained a place among the foremost thinkers of the age. He contends that philosophy must seek corroboration from results inductively obtained in the physical sciences. He assumes that there is in nature an unconscious will and idea as a pure and spiritual activity, without a substratum of nerve or brain, which is the basis of consciousness. The same unconsciousness he finds in spirit, in the human instinct, sexual love, emotions, morals, æsthetics, and thought, in the development of language, sensual perceptions,

mysticism, and history. His metaphysics teach that unconsciousness is the last principle of philosophy, described by Spinoza as substance, by Fichte as the absolute I, by Schelling as the absolute subject-object, by Plato and Hegel as the absolute idea, and by Schopenhauer as the will. The attributes of the unconscious spirit are will and idea, and the world is the product of both. He affirms that it is neither possible for Hegel's "logical idea" to attain to reality without will, nor for Schopenhauer's "irrational will" to determine itself to prototypal ideas; and he demands, therefore, that both be conceived as coördinate and equally legitimate principles, which after the precedent of Schelling are to be thought of as functions of one and the same functioning essence. The end of development is the turning back of volition into non-volition, which is attained by means of the greatest possible intensification of consciousness, resulting in the emancipation of the idea from the will. Among Hartmann's minor publications are several poetical productions.

HARTMANN, Moritz, a German poet of Jewish parentage, born at Duschnik, Bohemia, Oct. 15, 1821, died in Vienna, May 13, 1872. He studied in Prague and Vienna; but umbrage being taken at his liberalism, he left Austria, and published a volume of patriotic poems, *Kelch und Schwert* (Leipzig, 1844), which was followed in 1847 by *Neuere Gedichte*. In 1848 he was a prominent liberal member of the Frankfort parliament, and accompanied Froebel and Blum to Vienna, whence he escaped after the execution of Blum, and travelled extensively, spending a considerable time in the East during the Crimean war, and several years in Paris. In 1860 he delivered lectures on German literature and history in the academy of Geneva. In 1863 he removed to Stuttgart, and in 1868 to Vienna. Among his best known novels are: *Der Gefangene von Chillon* (1863); *Die letzten Tage eines Königs* (1866), which has been translated into English; and *Die Diamanten der Baronin* (2 vols., 1868). Of his political writings the most notable is *Reimchronik des Pfaffen Mauricius* (1849), a satire on the Frankfort parliament, written in the manner of the old rhyming chronicles. A complete edition of his works was published at Stuttgart in 10 vols. in 1874.

HARTSHORN, Spirits of. See AMMONIA.

HARTSOECKER, Nicolaas, a Dutch philosopher, born in Gouda, March 26, 1656, died Dec. 10, 1725. He was intended for the church, but devoted himself to scientific pursuits. One of his earliest inventions was an improved form of object glasses for microscopes, which enabled him to discover animalcules in the animal fluids, on which a new doctrine of generation was formed. Subsequently in Paris he succeeded in manufacturing object glasses for telescopes superior to any previously made. An account of these discoveries was published in the *Journal des Savants* of Paris by Huygens, and in

1694 Hartsoeker published there an *Essai de dioptrique*, followed in 1696 by *Principes de physique*. He afterward returned to Holland, and while there was introduced to the czar Peter, who endeavored without success to induce him to settle in St. Petersburg. After filling for several years the professorship of mathematics in Düsseldorf, he retired to Utrecht. One of his last works was *Recueil de plusieurs pièces de physique*, in which the system of Newton was assailed with more violence than force. Previous to this he published his lectures under the title of *Conjectures physiques* (Amsterdam, 1706-'8), and a number of other works, many of a controversial nature.

HARTSVILLE, a town of Bartholomew co., Indiana, about 40 m. S. S. E. of Indianapolis; pop. in 1870, 433. It is the seat of Hartsville university, established in 1851 under the auspices of the United Brethren, which in 1872 had 14 professors and instructors and 117 students, mostly in the preparatory department, of whom 38 were females. The theological school connected with the university had one professor and 11 students.

HARTWICK, a town of Otsego co., New York, situated on the Cooperstown and Susquehanna Valley railroad, 4 m. S. of Cooperstown and Otsego lake, and about 60 m. W. of Albany; pop. in 1870, 2,339. The surface is a hilly upland, the highest summits being from 200 to 350 feet above the valleys. The E. part is drained by the Susquehanna, and the W. part by Otsego creek. The town contains four post offices, viz.: Hartwick, Hartwick Seminary, South Hartwick, and Toddsville. In the village of Hartwick Seminary is Hartwick theological and classical seminary, incorporated Aug. 13, 1816, and endowed by John C. Hartwick, from whom it received its name. The building has recently been remodelled, and is now one of the finest seminary buildings in the state. Hartwick seminary is connected with the Lutheran church, and in 1873-'4 had 5 instructors and 85 students, of whom 60 were males and 25 females, and 7 were in the theological department. There are 3,000 volumes in the library.

HARTZ (Ger. *Harz*, or *Harzgebirge*), the most northwestern mountain range in Germany, between lat. $51^{\circ} 30'$ and 52° N., and lon. $10^{\circ} 10'$ and $11^{\circ} 30'$ E. It separates the waters of the Weser from those of the Elbe. This range is divided into two parts, Upper and Lower



The Brocken.

Hartz, lying W. and E. of the Brocken. Their principal axis, which extends in a direction about W. N. W., E. S. E., is not far from 60 m. in length. The width of this main chain, as from Wernigerode to Ilfeld, is about 18 m. The highest summit is the Brocken, a mountain of feldspathic granite, which by its easy decomposition has caused the mountain to assume a rounded graceful form. It rises to the height of 3,737 ft., and overlooks all the surrounding country. The Rosstrappe stands near by in the same group, and is of somewhat inferior elevation to the Brocken, from which it is separated by formations of argillaceous slates and the lower limestones. It is composed of granite in which quartz predominates, giving to the rock a more indestructible character and to the mountain a more rugged aspect than that of the Brocken. The Rammelsberg is a mountain of argillaceous slate and the older sandstones, reaching the height of about 1,200 ft. above the plain near the town of Goslar. The district comprising these mountains is principally made up of granitic rocks, which form the highest summits, and of gneiss, argillaceous slates, and metamorphic

limestones and sandstones, which are grouped around, and penetrated by, the granites. Various rocks of the upper secondary, from the *grès bigarré* or new red sandstone to the chalk, repose unconformably upon the older formations around their marginal outcrop. The more elevated portions of the district are rough and dreary, with a sterile soil and a cold climate. Numerous streams take their rise in the Hartz mountains. Tributary to the Elbe are the Helme, which flows through the deep and beautiful valley called the Goldene Aue, and the Zorge, on the south; the Eine, Selke, and Bode, on the east; and the Holzemme on the north. The Ilse, which forms several fine cataracts in its course, the Ecker, Radau, and Ocker, on the north, and the Innerste, Söse, and Sieber, on the west, flow into the Weser. The valleys, being well watered, are very fertile, and produce abundant pasturage, and large herds of cattle are reared here. This district is also well wooded, and timber forms an important article of export. But the mines, chiefly of lead, silver, copper, zinc, and iron, are the principal source of the wealth of this region. The other minerals found here are sulphur, arsenic, granite, marble, and gypsum; and in the east are a number of important salt springs. For many centuries the mines have been industriously worked, and the business connected with them gives employment to about 30,000 persons. The mines belong chiefly to the province of Hanover (Prussia) and Brunswick; the former possessing those at Clausthal and Andreasberg, in the Upper Hartz, and the latter a portion of those in the Rammelsberg near Goslar. Those of the eastern Hartz are in the territory of Anhalt. The Rammelsberg mines were opened about the year 970, those of the Upper Hartz mostly in the 16th and 17th centuries; and the chief towns upon their sites, as those above named and Altenau, Zellerfeld, Lautenthal, Wildemann, and Grund, were founded in consequence of the discoveries of the mineral resources beneath the surface. These mining towns (*Bergstädte*) are entitled to special privileges, and no business is conducted in them but what is connected with mining and metallurgy. Clausthal is the headquarters of these operations. The council which has general charge of the mines meets here, and here are a mint and a school of mines, the latter furnished with a fine collection of minerals and models of mining and other machinery. The mines of the Upper Hartz belong either to the group at Clausthal or that of Andreasberg. In the former the veins follow several lines of fracture in an E. and W. direction. One passes through the town of Zellerfeld, extending from Wildemann to Clausthal, a distance of 3 m. They produce argentiferous galena, copper pyrites, and blende in a quartzose gangue, intermixed with calcareous spar, brown spar, heavy spar, and spathic iron. They are remarkable for spreading out in thin branches through a great breadth of rock, and at Clausthal these

strings are profitably explored throughout a width of 300 ft. The famous drainage level of these mines is noticed in the article ADIT. The mines and city of Andreasberg are situated upon the steep slope of a mountain of argillaceous and silicious slates. The whole area occupied by the former is hardly a mile square. Rich silver ores are found here in small veins, as the antimonial sulphuret of silver and ruby-red silver of the dark and light varieties. Argentiferous galena is also a product of these mines. At this locality is found the deepest mine in the world. It is upon an argentiferous vein, which has been followed to the depth of more than 2,500 ft. from the surface, the last 800 ft. since about the year 1820. The richest ores are found in courses which extend only about 100 ft. in length on the vein. The best of these was struck at a depth of about 2,160 ft., and has continued highly productive to the greatest depth named. The Rammelsberg mines produce similar ores to those of the Upper Hartz district. On account of the extreme hardness of some of the veinstones of these mines, it has been the practice, instead of attempting to drill the rock for blasting, to build a large fire against the face of the vein, and leave this to act upon the ingredients, like the arsenic and sulphur, which may be volatilized, and thus cause the mass to be easily attacked and broken down to some extent. Various other ores have been obtained in the Hartz besides those named. Iron mines have been extensively worked; ores of antimony have been produced to some extent, as also those of cobalt and manganese. A small quantity of gold has also been found in Anhalt. The rare metal selenium has been extracted from the seleniuret of lead of the same district. The Mansfeld bituminous copper slates are singular ores, of so low a percentage that the copper pyrites disseminated through them is not visible, yet they have been long profitably worked in the Lower Hartz. The annual production of the Hartz mines, not including that of the Rammelsberg, which also yields 5 lbs. of gold, is about 40,000 lbs. of silver, 5,000 to 6,000 tons of lead, 150 tons of copper, and 10,000 tons of iron.—The population of the Upper and Lower Hartz speak different dialects. Besides the Brocken or Blocksberg, which plays an important part in the popular legends and fairy tales of Germany, and which is immortalized in Goethe's "Faust," there are many remarkable localities in the Hartz, as the Stauffenberg, with the ruins of the castle of Henry the Fowler, the castle of Falkenstein, the Alexisbad, &c. The Teufelsmühle, Rosstrappe, and the valley of the Bode are renowned for their fine and peculiar scenery; and two curious caves, Baumannshöhle and Bielschöhle, are interesting on account of their fossil bones.

HARTZENBUSCH, Juan Eugenio, a Spanish author, born in Madrid, Sept. 6, 1806. His father was a German carpenter. He was educated by the Jesuits and intended for the church, but,

becoming interested in literature, he translated a number of French and Italian comedies and prepared for the stage several of Calderon's plays. He also composed many short poems. In 1835 he became a stenographer on the staff of the *Gaceta de Madrid*. In 1836 an original drama by him, entitled *Los amantes de Teruel*, was played with success, and he afterward produced many others. He has also published critical editions of the works of Tirso de Molina (12 vols., Madrid, 1839-'42), of Calderon (4 vols., 1849-'51), of Alarcon (1852), and of Lope de Vega (4 vols., 1853). Among his own works are *Cuentos y fábulas* (2 vols., 1861), *Obras de encargo* (1864), and *Obras escogidas* (2 vols., Leipzig, 1865). In 1852 he was named president of the theatrical council, and he has been since 1862 director of the national library.

HARVARD, John, the founder of Harvard college, born in England, probably in Middlesex, died in Charlestown, Mass., Sept. 24, 1638. He was educated at the university of Cambridge, and having emigrated to America was made a freeman of the colony of Massachusetts, Nov. 2, 1637. The following year, as appears from the town records, a portion of land was set off for him in Charlestown, where he exercised the ministry. In April, 1638, he was appointed one of a committee "to consider of some things tending toward a body of laws." These are the only particulars known of his life. His property at his death was worth about £1,500, one half of which he gave for the erection of the college which bears his name; but part of this bequest, we are told, was diverted from its original purpose. He also left to the college a library of more than 300 volumes. A monument to his memory was erected in the burial ground of Charlestown by the alumni of the university, and inaugurated with an address by Edward Everett, Sept. 26, 1828.

HARVARD UNIVERSITY, the oldest and the most amply endowed institution of learning in the United States, situated in Cambridge, 3 m. W. of Boston, Mass. Six years after the first settlement of this region by the English the following entry appears on their records, under date of Oct. 28, 1636: "The court agreed to give 400*l.* towards a schoale or colledge, wheare of 200*l.* to bee paid the next yeare, and 200*l.* when the worke is finished, and the next court to appoint wheare, and what building." The next year the court ordered that the college should be at "Newetowne," and designated the governor and deputy governor, with ten others, including the principal laymen and ministers of the colony, among whom were John Cotton and John Winthrop, to have charge of the undertaking. Under date of March 13, 1639, it was "ordered, that the colledge agreed upon formerly to bee built at Cambridg shal bee called Harvard Colledge." By the change of the name Newtown to Cambridge it was designed to honor the famous English university, of which some of the early settlers were

graduates, and the name Harvard was given to the institution in recognition of the liberal endowment of about £700 left by the will of the Rev. John Harvard in 1638. It is doubtful whether the original grant of £400 was ever actually paid. It is certain that the project for a college lay in abeyance until the bequest of Harvard at once initiated the necessary measures. In 1638 a class began a course of study in the college under Nathaniel Eaton. The first class graduated, in 1642, consisted of nine members. Efforts were made to educate a few of the aborigines as teachers of their own race, but only one Indian was ever graduated. In 1642 the general government of the college and the management of its funds were vested in a board of overseers, consisting of "the governor and deputy governor for the time being, and all the magistrates of this jurisdiction, together with the teaching elders of the six next adjoining towns—viz., Cambridge, Watertown, Charlestown, Boston, Roxbury, and Dorchester—and the president of the said college." In 1650 the general court granted a charter to the college, under which it became a corporation with the title of the "President and Fellows of Harvard College," consisting of the president, five fellows, and a treasurer or bursar, to have perpetual succession by the election of members to fill vacancies. In October, 1680, by order of the general court, the ferry between Boston and Charlestown was granted to the college. The town of Cambridge gave several parcels of land, as did other public bodies and private individuals. The legislatures of the colony, province, and state of Massachusetts made grants, in early times regular ones annually, to pay the salary of the president, and to aid in the support of some one or two other officers or teachers in the college, as also occasional gifts for special purposes; while lotteries were chartered to obtain money for building some of the older college halls. The last grant made to the college from the public treasury was in 1814. When a constitution was framed for the commonwealth in 1780 the perpetual enjoyment of all their vested rights and powers was secured to the president and fellows of Harvard college, and the council and senate were made the successors of the magistrates in the board of overseers as constituted in 1642. The organization of the board of overseers, under the direction of the legislature, underwent various changes until 1865, when the connection of the college with the commonwealth was dissolved, and the control of the university was vested in its alumni. Besides the president and treasurer of the university, who are *ex officio* members, the board consists of 30 members, divided into six classes, of five each, who after a term of six years go out of office in rotation, five overseers being elected by the alumni each year. The first election of overseers by the alumni was held in Cambridge on commencement day in 1866. Only inhabitants of the state are eligible as

members of the board, and no alumnus is "entitled to vote for overseers before the fifth annual election after the graduation of his class." The first degree of D. D. ever granted by the institution was conferred upon Increase Mather in 1692. A few years later Harvard college received the first of a series of munificent gifts from the Hollis family, including some valuable books. In 1764 the library was destroyed by fire, and about 6,000 volumes were lost, including all of Harvard's books except one, the oriental collection bequeathed by Dr. Lightfoot, and the Greek and Roman classics presented by Bishop Berkeley. Harvard has had 22 presidents, as follows:

NAMES.	Term of service.	NAMES.	Term of service.
Henry Dunster....	1640-1654	Joseph Willard....	1781-1804
Charles Chauncy....	1654-1672	Samuel Webber....	1806-1810
Leonard Hoar....	1672-1675	John Thornton	
Uriah Oakes....	1675-1682	Kirkland.....	1810-1828
John Rogers....	1682-1684	Josiah Quincy....	1829-1845
Increase Mather....	1685-1701	Edward Everett....	1846-1849
Samuel Willard		Jared Sparks....	1849-1858
(acting).....	1701-1707	James Walker....	1853-1860
John Leverett....	1708-1724	Cornelius Conway	
Benj. Wadsworth....	1725-1737	Felton.....	1860-1862
Edward Holyoke....	1737-1769	Thomas Hill.....	1862-1868
Samuel Locke....	1770-1773	Charles William El-	
Samuel Langdon....	1774-1780	iot.....	1868

—The external administration of the university is vested in two separate boards, viz., the pres-

ident and fellows, known also as the corporation of Harvard college, and the overseers. The latter body has undergone various changes in its organization, but its general powers and duties are the same as those conferred by the act of 1642, giving the board "full power and authority to make and establish all such orders, statutes, and constitutions as they shall see necessary for the instituting, guiding, and furthering of the said college, and the several members thereof, from time to time, in piety, morality, and learning;" and "also to dispose, order, and manage" all the funds and property of the institution. The "corporation," consisting of the president and treasurer of the university and five fellows, is vested with the right to acquire and to hold property and to sue and to be sued. With this board originate all nominations to office in the university, as well for filling vacancies in its own body, as for president, professors, and other officers of instruction. Its action, however, is subject to the approval of the board of overseers. The functions of these two governing bodies extend to all the professional and special schools of the university. The internal government of the institution is administered by the president, deans, and faculties composed of officers of instruction. Besides the dean and faculty of the



Matthews Hall (showing also Massachusetts, Harvard, and Hollis Halls).

college proper, each professional department has a dean and special faculty; but the president of the university is the president of each of the faculties. In 1870 the office of dean of the college faculty was created to relieve the president of a portion of his duties.—The university lands in various parts of Cambridge comprise about 60 acres. The college yard contains about 15 acres, tastefully laid out and

adorned by many stately old elms. Here, forming a large quadrangular enclosure, are clustered 15 extensive buildings, of brick or stone, from two to five stories high. Hollis, Stoughton, Holworthy, Grays, Thayer, Weld, and Matthews halls, the last three erected since 1870, are exclusively dormitories, which, with College house and Holyoke house, on the opposite side of the street from the college grounds,

have accommodations for nearly 700 students. The remaining buildings include Massachusetts hall, erected in 1720, Holden chapel, and Harvard, University, and Boylston halls, all devoted to recitation, lecture, and examination



Appleton Chapel.

rooms, offices, and laboratories; Appleton chapel, with seats for 900; Gore hall, containing the library; and Dane hall for the law school; besides several residences occupied by the



Gore Hall.

president and professors. In the near vicinity of the college yard are the gymnasium, the scientific and mining schools, the divinity school, and the museum of comparative zoölogy. About three fourths of a mile N. W. of the college group is the botanical garden, con-

taining a valuable herbarium, and near it the observatory. On the delta near the college yard stands Memorial hall, erected by the alumni and friends of the college in commemoration of the students and graduates of the university who died in the national service during the civil war. It is constructed from designs by Ware and Van Brunt of Boston, of red and black brick, with copings and window tracery of Nova Scotia stone, and is 310 ft. long by 115 ft. wide. The interior comprises three grand apartments: dining hall, 164 by 60 ft., and 80 ft. high, capable of seating 1,000 persons; memorial vestibule, 112 by 30 ft., and 60 ft. high; and the academic theatre. The dining hall, said to be the grandest college hall in the world, will be used for college festivals, and probably by the Thayer club, an organization supported and managed by students for the purpose of obtaining board at cost. The great west window, 23 ft. wide and 30 ft. high, will be filled with stained glass, as will also in course of time the 36 side windows. Between the dining hall and the academic theatre, which is not yet completed, is the memorial vestibule, surmounted by a tower 200 ft. high. The interior is surrounded by an arcade of black walnut, with marble tablets inscribed with the names of the 120 students commemorated, and the date and place of their death. The walls above are simply decorated in color, with Latin inscriptions, mostly taken from the poets. At either end are large windows filled with stained glass. The estimated cost of the entire structure is \$575,000.—Besides the college proper, the university comprises

the divinity school, law school, medical school, dental school, Lawrence scientific school, school of mining and practical geology, Bussey institution of agriculture and horticulture, observatory, botanic garden and herbarium, and Peabody museum of American archaeology and ethnology; and is connected with the museum of comparative zoölogy. All of these are in Cambridge except the medical and dental schools, which are in Boston, and the Bussey institution, which is in Jamaica Plain. A notice of the Episcopal, theological school in

Cambridge appears in the catalogue of the university, but there is no connection between the two institutions.—During the past few years many radical changes have been made in the courses of study in the college, with a view of perfecting a system of instruction

which by its elasticity and thoroughness will best accommodate itself to the widely varied tastes and abilities of different students. The preparatory course of study, pursued in schools having no connection with the univer-

sity, has also undergone a marked revision, in consequence of the changes in the requirements for admission to the college, the aim of the faculty being that the best preparatory training shall be afforded to young men, up to an average age of 18, who intend to pursue non-professional studies for four years or more. Since 1874 candidates have been required to pass an examination in one of two courses of study, the selection being optional with the applicant. Each course embraces 14 subjects (including subdivisions) which are substantially

the same in both, viz.: Latin, Greek, mathematics, ancient history and geography, modern and physical geography, and English composition. In one course, however, classical studies predominate, and in the other mathematical and physical. Besides these, there are optional examinations in the classics, mathematics, and physics, for the accommodation of those who desire to be admitted to advanced standing in these, or to pursue elective studies in other departments. In addition to the above, applicants for admission in 1875 and thereafter will be required to translate "easy French prose at sight," with the option of substituting German; and in 1876 requirements in elementary science will be added, the applicant having a choice among the subjects of botany, physics and chemistry, and descriptive astronomy. Two examinations for admission are held, one at the beginning and the other at the close of the academic year. In view of the recently added requirements for admission, and to enable students to enter college at the average age of 18, candidates may divide the admission examination into two, separated by an interval of not less than an academic year. The academic year, which is the same for all departments of the university, extends from the last Thursday of September to the last Wednesday of June, with a vacation of two weeks at the winter holidays. The studies pursued in the academic department are classified into prescribed and elective; the former occupy the whole of the freshman year and about one third of the sophomore and junior years. The studies of the freshman year are Greek, Latin, mathematics, German, ethics, and chem-

istry, 16 hours a week being devoted to recitations. In the sophomore and junior years the required studies are elementary, embracing in the former physics, rhetoric, themes, history, and elementary French for those who



Memorial Hall.

have not passed a satisfactory examination in that language at the beginning of the year; and in the latter logic, psychology, and a portion of the course in rhetoric, as well as of that in themes and forensics. In the senior year only certain written exercises belong to the required course. Numerous courses of elective studies are provided for students in the sophomore, junior, and senior years, who may also choose any of the prescribed studies in the course upon condition of being qualified to pursue them. The elective studies embrace the following courses: 1, the classics, including, besides Latin and classical Greek, ecclesiastical Greek, Hebrew, and Sanskrit; 2, modern languages, including the Anglo-Saxon, and early English, modern Greek, German, French, Romance philology, Italian, and Spanish; 3, philosophy; 4, history; 5, political science; 6, mathematics; 7, physics, including chemistry; 8, natural history; 9, music. In addition to the prescribed studies, every sophomore is required to pursue four courses chosen by himself from the elective studies, with at least two exercises a week each, every junior three courses with three exercises a week each, and every senior four courses with three exercises a week each. Sophomores and juniors may be relieved from pursuing any of the required studies of those years by passing an examination in such studies at the beginning of the year. It will thus be seen that the opportunity is afforded to students of pursuing the ordinary collegiate course, or of concentrating their study upon a limited number of subjects. Examinations in writing are required in every study at the end of the year, besides

similar examinations on nearly every subject in the middle of the year. A large portion of the instruction is given by lectures. A system of special honors, classified as "honors" and "second-year honors," has recently been established for the encouragement of those who wish to attain distinction in special departments of study. The former are awarded at the close of the college course to such students as prove by examination exceptional proficiency in any one of the following courses: classics, modern languages, philosophy, history, mathematics, physics (including chemistry), and natural history. Candidates for honors in the classics or in mathematics must have previously taken second-year honors in the same department. Second-year honors in the classics and in mathematics are awarded to sophomores and juniors upon special examination. The honors awarded are stated in the diploma. The degree of bachelor of arts conferred by Harvard university has been graded as the ordinary degree and the degree with distinction. In the latter case the distinction is indicated in the diploma by the words *cum laude*; to obtain this the candidate must have attained 80 hundredths of the maximum mark for the whole college course, or 87 hundredths of that for the junior and senior years combined. The necessary expenses of an undergraduate during the academic year range from \$400 to \$650, the tuition being \$150. Pecuniary aid afforded to students removes the necessity of any leaving college through indigence. Ninety-two scholarships varying in their annual income from \$40 to \$350 have been established, and the number is rapidly increasing. More than \$20,000 from this source is gratuitously distributed each year among the undergraduates, the preference being given to those ranking highest as scholars. From other beneficiary funds about \$750 is annually distributed in gratuities ranging from \$50 to \$100. There is also a loan fund, the annual interest of which, amounting to more than \$2,000, is lent to students in sums ranging from \$50 to \$150, payable at their option. Besides the above, students may derive an income from acting as monitors; the various monitorships amount to about \$1,200 a year. Twenty-three prizes, yielding annually \$895 in sums from \$15 to \$100, are open to undergraduates.—In the divinity school are two professorships of theology, one of ecclesiastical history, one of New Testament criticism and interpretation, and one of Hebrew, besides a lectureship on Biblical literature. Bachelors of arts are admitted without examination; others are required to pass an examination in Latin and the Greek text of the gospels. The full course occupies three years, on the completion of which the degree of bachelor of divinity is conferred only upon examination. The necessary expenses are about \$300 a year. There are nine scholarships, yielding \$1,695 annually, in sums rang-

ing from \$125 to \$260, and nearly \$3,000 from other funds is annually distributed among the students. The course of study in the law school occupies two years. There are no requirements for admission except that the applicant, if not a college graduate, must be at least 19 years old. But an examination is required for admission to an advanced portion of the course in the case of candidates for a degree. Instruction is given by recitations, lectures, and moot courts, by three full professors, an assistant professor, and several lecturers. The cost of tuition for the first year that a student is a member of the school is \$150, for the second \$100, and for any subsequent year \$50. Eight scholarships, of the annual value of \$100 each, are assigned at the beginning of each academic year to students who have been in the school the whole of the preceding year, and intend to remain throughout the ensuing year. Prior to 1871-'2 the degree of bachelor of laws was conferred upon all who had been enrolled as students a year and a half; it can now be obtained only upon examination. In the Lawrence scientific school courses of instruction are provided for three classes of persons: 1, those desiring the ordinary practical education in engineering and science; 2, those preparing to be teachers; 3, those desiring advanced instruction in science preparatory to the degree of doctor of philosophy or doctor of science. The instruction preparatory to the degrees of civil engineer and bachelor of science comprises a four years' course in civil and topographical engineering, and three years' courses in practical and theoretical chemistry, in natural history, and in mathematics, physics, and astronomy. The teachers' course embraces one year's study in the elements of natural history, chemistry, and physics. Instruction for candidates for the doctor's degree and other advanced students is provided in physics, chemistry, zoölogy, botany, and mathematics. Candidates for admission to any one of the regular courses leading to the degree of civil engineer or bachelor of science must be examined; but no examination is required for admission to the teachers' course, or that for advanced students. The degree of civil engineer is conferred after examination upon students who have completed the course in civil and topographical engineering. To obtain the degree of bachelor of science the student must have attended the school for at least one year, have completed the course of studies in one or more departments, and pass the examination. The course of study pursued and the grade of merit are specified in the degree, the three grades being indicated by *cum laude*, *magna cum laude*, and *summa cum laude*. The tuition fee for any of the courses in the scientific school is \$150 a year. There are four scholarships yielding annually \$150 each. The full course in the school of mining and practical geology occupies four years, on the completion of which

the degree of mining engineer is conferred after examination. In the case of candidates for this degree an examination for admission to the school is held. Instruction in practical astronomy and the use of astronomical instruments, including the spectroscope, is given at the observatory by the director and three assistants. In 1871 a complete revolution in the system of instruction was made in the Harvard medical school. The new plan went into effect at the beginning of the academic year 1871-'2, and up to this time (1874) this institution has stood alone in its efforts to introduce this radical reform into the system of medical education in the United States. Under the new system instruction is given by lectures, recitations, clinical teaching, and practical exercises distributed throughout the academic year. This extends from the last of September to the last of June, and is divided into two equal terms. The course of instruction occupies three years, beginning with the fundamental subjects of anatomy, physiology, and chemistry in the first year, and proceeding systematically through all the recognized branches of a good medical education. In the important subjects of anatomy, physiology, chemistry, and pathological anatomy, obligatory laboratory work is substituted for or added to the usual didactic lectures. Instead of the customary oral examination for the degree of doctor of medicine held at the end of the course, a series of written examinations on all the main subjects of medical instruction is distributed for regular students through the entire course. Other students may pass all of those examinations together at the end of the course. Besides being obliged to pass the required examinations and present a thesis, every candidate for a degree must be 21 years of age, and must have studied medicine three years and attended this school for one year. The cost of tuition is \$200 a year. A special course is provided for graduates in medicine desiring advanced instruction. The marked diminution in the number of students which attended the introduction of this change has been followed by a rapid annual increase in the number of applicants for admission. The dental school affords, by lectures, recitations, and practical demonstrations, a complete course of instruction in the theory and practice of dentistry. Courses of study are provided in anatomy, physiology, chemistry, surgery, operative and mechanical dentistry, and dental pathology and therapeutics. The academic year is divided into two equal terms. Attendance during the winter term only is required for graduation. The degree of doctor of dental medicine is conferred upon those candidates of adult age who have pursued their professional studies three years under competent instructors, and attended two courses in this institution, and who pass the required examination. Attendance upon one course of lectures in another dental or medical school

may be substituted for the first course in this school. The tuition fee is \$110 for the winter term, or \$150 for the year. The school of agriculture and horticulture, established in execution of the trusts created by the will of Benjamin Bussey, affords thorough instruction in agriculture, useful and ornamental gardening, and stock raising. The regular course of study to be pursued by candidates for a degree occupies three years, and embraces instruction in physical geography, meteorology, geology, chemistry and physics, botany, zoölogy, and entomology, in levelling and road building, and in French and German. The studies of the first year are pursued at the Lawrence scientific school in Cambridge; those of the remaining two years at the Bussey institution near Jamaica Plain. The museum of comparative zoölogy was founded in 1859, with Agassiz as director, in which position he continued until his death in 1873. It is under the direction of the faculty, while the property is held by the trustees, who also appoint the director; the assistants are appointed by the faculty. The extensive collections are open to visitors every day except Sunday. Instruction in natural history is given by the director and 11 assistants. The building of the museum contains 10 distinct working laboratories. Connected with the museum of comparative zoölogy is the Anderson school of natural history on Penikese island, one of the Elizabeth group, about 16 m. S. W. of Cape Cod. This institution was founded by John Anderson of New York as a summer school of natural history, and was opened in 1873 under the personal supervision of Prof. Agassiz. (See ELIZABETH ISLANDS.) The Peabody museum of American archæology and ethnology was founded by the late George Peabody, who gave \$150,000 for that purpose. The object of the founder was the formation and preservation of collections in archæology and ethnology, and to afford instruction in those departments. No building has yet been erected for a museum, and no organization except the board of trustees has been effected; but large collections pertaining to archæology and ethnology have been made.—Besides those already mentioned, the degrees of master of arts, doctor of science, and doctor of philosophy (Ph. D.) are conferred in accordance with the regulations adopted at the beginning of the year 1872-'3. Prior to that time the latter two degrees had not been conferred by this university, while that of master of arts could be obtained by any Harvard graduate after a period of three years from graduation, by paying a fee of \$5. These degrees are now conferred only upon written examinations, and in conformity with specified regulations as to residence, graduation, &c.; the aim being to encourage young men to devote one or more years to liberal study after obtaining the bachelor's degree. The degrees of master of arts and doctor of philosophy are open only to bachelors of arts; those who have not gradu-

ated at Harvard must prove that the course pursued by them is equivalent to the requirements for the bachelor's degree in this university, or must pass such additional examinations as the faculty may prescribe. To become a master of arts, the candidate, after taking the bachelor's degree, is required to pursue for at least one year at the university an approved course of study, and to pass an examination on that course. This degree is also conferred upon graduates of the law or divinity school of Harvard university who are at the same time bachelors of arts, and who pass an examination in a course of study in law or theology after pursuing that course one year at the university. A university residence of at least two years is required of the candidate for the degree of doctor of science, who, besides being a bachelor of science, must also have pursued during three years an approved course of scientific study embracing at least two subjects, and must sustain an examination in those studies. Only a two years' course, however, is required of students who are both bachelors of arts and bachelors of science of Harvard university. The degree of doctor of philosophy is conferred upon those who, after taking the degree of A. B., pursue at the university for two years an approved course of liberal study in any of the following departments: philology, philosophy, history, political science, mathematics, physics, and natural history. Candidates are further required to pass a thorough examination on that course and present a satisfactory thesis. The fee for the examination for the degree of master of arts is \$30, and for that of doctor of philosophy or doctor of science, \$60. All the elective courses of study in Harvard college are open to graduates of other colleges on payment of the fees. For male students, and for candidates for the advanced degrees, the fees range from \$50 a year for three hours of instruction a week, to \$120 for six hours. For the encouragement of a more thorough scholarship than is acquired by undergraduates, six fellowships for graduates have been established, each of which has an income large enough to support a student. Four of them are so far free from restrictions that students while holding them may pursue their studies either in this country or in Europe. No distinction is made as to color or age in the admissions to Harvard college, but women are excluded. A system of examinations for women has however been adopted, the first of which was held in June, 1874. A general or preliminary examination in English, French, physical geography, botany or physics, mathematics, history, and German, Latin, or Greek, is held for those not less than 17 years old. The advanced examination is for women not less than 18 years old who have passed the preliminary examination. It comprises five departments, languages, natural science, mathematics, history, and philosophy, in one or more of which the candidate may

present herself. The function of the university is limited to preparing the examination papers, examining the work of the candidates, recording its results, and giving certificates to those who pass. The examinations may be held in any city or town. The preliminary examination continues during seven days. A fee of \$15 for the preliminary and \$10 for the advanced examination is required.—The various libraries of the university contain 200,000 volumes, distributed as follows: college, 136,000; botanical garden, 4,000; divinity school, 16,000; law school, 15,000; Lawrence scientific school, 3,000; medical college, 2,000; museum of comparative zoölogy, 5,000; observatory, 3,000; society libraries of students, 16,000. The university has no funded property from the public treasury, but has always depended upon the revenues from students and the gifts of individuals, which have far surpassed in number and magnitude those made to any other American institution of learning. No value is reported for the lands and buildings used for college purposes, and the various collections, libraries, apparatus, works of art, &c. The total investments of the college in 1873 were stated by the treasurer at \$2,765,110, of which \$1,854,372 was productive and yielded an annual income of \$133,676. The total number of officers of instruction in the university in 1873-'4, exclusive of librarians, proctors, &c., was 110, including 50 professors, 25 assistant professors, 12 lecturers, 5 tutors, 11 instructors, and 12 assistants. In the college proper there were 18 professors, 15 assistant professors, 5 tutors, 4 instructors, and 8 assistants. The whole number of students was 1,174, including 35 candidates for higher degrees and 10 resident graduates. Of the 706 undergraduates, 217 were in the freshman, 170 in the sophomore, 155 in the junior, and 164 in the senior class. The following statement indicates the number of instructors and pupils in the different departments of the university, the same instructors in some instances being counted in two departments:

DEPARTMENTS.	Professors.	Assistant professors.	Other instructors.	Total of instructors.	Students.
Academic department.....	18	15	17	50	706
Bussey institution.....	3	2	7	12	3
Dental school.....	5	4	4	13	31
Divinity school.....	5	..	1	6	22
Lawrence scientific school.....	10	4	8	22	42
Law school.....	3	1	2	6	188
Medical school.....	10	5	13	28	175
Museum of comparative zoölogy....	..	..	..	12	..
School of mining.....	9	1	..	10	..

The total number of instructors in all departments has increased from 45 in 1865-'6 to 110 in 1873-'4, the number of students from 936 to 1,174, and the number of volumes in the libraries from 165,000 to 200,000. In the college proper during that period the number of instructors has increased from 22 to 50, the

number of students from 413 to 706, the library from 110,000 to 136,000 volumes, and the number of scholarships from 41 to 92. According to the triennial catalogue of 1872, the university had conferred 12,175 degrees, including 596 honorary. The number of graduates from the college was 8,330, of whom 3,088 were living; 2,036 students had graduated from the medical, 1,720 from the law, 428 from the theological, 183 from the scientific, 39 from the dental, and 4 from the mining school.—See "A History of Harvard University," from 1636 to 1776, by Benjamin Peirce (1833); "The History of Harvard University," by Josiah Quincy (1840); "A Sketch of the History of Harvard College," by Samuel Atkins Eliot (1848); and "Biographical Sketches of Graduates of Harvard University" (1642-'58), by John Langdon Sibley (vol. i., 1873).

HARVEST FLY, a hemipterous insect, of the division *homoptera* (from having the wing covers of the same texture throughout), of the family *cicadadae*, and chiefly of the genus *cicada* (Oliv.), improperly called locusts in America. It has been known from remote antiquity, and is the *τεττις* of the Greeks, *cicada* of the Latins, *cigale* of the French, and *cicala* of the Italians. The harvest flies or cicadians have short antennæ, conical, six-jointed, and tipped with a little bristle; wings and wing covers in both sexes, inclined at the sides of the body; three joints in the tarsi; a hard skin; and in the female a piercer lodged in a groove under the end of the body. Those of the genus *cicada*, which has been improperly translated grasshopper, are easily known by their broad heads; their large, convex, and brilliant eye on each side, and three simple eyes on the crown; their wings and the covers veined and transparent; and an elevation on the back part of the thorax in the form of an X. The males make a loud rattling sound by means of a kind of kettle-drum apparatus on each side of the base of the abdomen; this is covered by two large oval plates, and consists of a cavity containing plated folds of a parchment-like membrane, transparent as glass; these are moved by muscular cords, whose alternate and very rapid contractions and relaxations produce a corresponding tension and looseness of the membranes and a consequent harsh rattling noise, heard to a considerable distance; the action is assisted by the rapid movements of the wings, and the sound is rendered more intense by the resonance of cavities within the body protected by valves. The piercer has two lateral plates toothed like a saw in the lower portion, and between them a spear-pointed borer. They have not the power of leaping like locusts and grasshoppers; the legs are short, and the anterior thighs are armed with two stout spines. In the perfect state they live only a few weeks, performing the work of reproduction and then dying; in the larva state they are wingless and subterranean, living on the juices of roots, and passing a series of years in the ground.

The *C. septendecim* (Linn.) is called the 17 years locust from the prevalent belief that its life is prolonged to that extent in the imperfect state; undoubted testimony, both from popular and scientific sources, proves that these insects usually appear at intervals of 17 years, but acci-

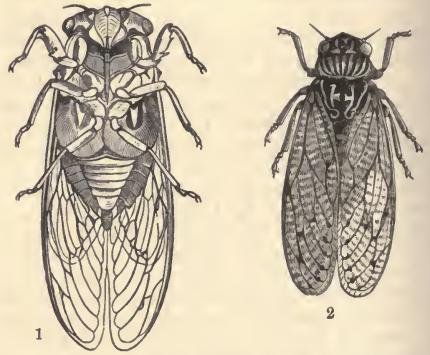


Seventeen Years Locust (*Cicada septendecim*).

dental circumstances may accelerate or retard their progress to maturity; though they appear in some parts of the country probably every year, and indeed in all districts except northern New England and to the north of that, the lineal descendants of each swarm appear only every 17 years; the popular name of locust was doubtless derived from this fact of their appearance in large swarms after long intervals of time, like the locusts of the East. In the perfect state this harvest fly is of a black color, the anterior edge and principal veins of its transparent wings and covers being orange red; near the tips of the covers there is a dusky zigzag line in the form of the letter W, which by the superstitious is supposed to indicate approaching war; as the mark on the other wing would be inverted like the letter M, the two were supposed to announce a war with Mexico during their appearance in Louisiana in 1835, which however did not arise until some years after; the eyes are red, with metallic reflections; the rings of the body are edged with dull orange, and the legs are of the same color; the expanse of wings is from $2\frac{1}{2}$ to $3\frac{1}{2}$ in. Though found upon almost all kinds of trees, except most evergreens, they prefer forests of oaks. The perfect insects emerge from the ground from February to the middle of June, according to latitude and the warmth of the season; their numbers are often so great that the limbs are bent and broken by their weight, from six to eight being sometimes seen on every leaf; the drumming sound is heard from morning to night, but most loudly between the hours of 12 and 2. They are not found in low alluvial lands, and a dry air is necessary for the perfection of the drumming. The males perform the act of reproduction and soon die; they present scarcely a trace of digestive apparatus, and probably take no nourishment; the sexual system is fully developed on emergence from the ground, each of their 500 sperm cells containing about 1,000 spermatozoa. The females have each about 500 eggs, of about $\frac{3}{8}$ of an inch in diameter, which when deposited are twice that size; their digestive sys-

tem is complete, and the demand for food to develop the eggs must be satisfied during their longer life; the females are one third smaller than the males. In order to deposit her eggs, the female clasps the smallest twig of a tree with her legs, and introduces the piercer to the pith obliquely and in the direction of the fibres, detaching little splinters by the lateral saws at one end to serve as a cover to the perforation; after boring a hole long enough for about 16 eggs, she introduces them in pairs side by side, but separated slightly by woody fibre, and standing obliquely upward; after making a nest and filling it in a space of 15 minutes, she makes others on suitable twigs until her stock is deposited; by this time incessant labor has so weakened her that she drops exhausted from the tree, and soon dies. The eggs are pearl white, very delicate, and are hatched in from three to six weeks, according to favoring circumstances. The twigs pierced by the insect wither and fall to the ground, either on account of the wound or because such are selected as would soon fall from natural causes; in this way many of the larvæ reach the earth, but most are developed on the trees; the emerging larva is about $\frac{1}{8}$ of an inch long, hairy and grub-like, of a yellowish white color, with six legs, the first of which are strong like lobster claws, and spiny beneath; there are rudiments of wings, or little prominences, on the shoulders, and under the breast is a long sucking ciliated tube with a central tongue. Active on leaving the egg, they in a few moments drop to the ground, and at once bury themselves beneath the surface by means of their fore feet; they follow the roots of plants, perforating them with their beaks and sucking their juices; they do not descend very deeply into the soil, and change but little during their long subterranean abode except in size and in development of the rudimentary wings. As the time of transformation approaches, they gradually advance toward the surface in cylindrical and circuitous passages, about half an inch in diameter and from a depth of one or two feet; now become pupæ, they gradually acquire strength for their final change; they leave the earth in a warm night and ascend trees, on which in a short time the pupa skin bursts on the back, and the perfect cicada comes forth. The ground is sometimes riddled like a honeycomb by their numbers, which in about six weeks are all dead. Did these insects appear every year or two in the same locality, fruit and forest trees would suffer much from their attacks, even though they only rob roots of juices; but fortunately they appear only at long intervals, and their eggs are eaten from the beginning by ants and other insects; the larvæ are also devoured by the same insects, by birds (especially woodpeckers), by toads and frogs, and other reptiles; when turned up by the plough, blackbirds and hogs eat great numbers of them; many perish in their wooden prison, and others are killed by the

fall from the trees; as they generally occur in swarms containing about the same number at each period, of course only a small proportion of the eggs laid can ever produce the perfect insect, probably not more than two of the deposit of each female arriving at maturity.—Another American species is the dog-day cicada (*C. canicularis*, Harris), so called from the time of its first appearance on July 25; it is about $1\frac{1}{2}$ in. long, with a spread of 3 in.; it is black above, with a powdery white substance on the under parts, and with green markings on the head, thorax, wing covers, and legs. These and several other species have the drumming apparatus, which is always integumental, having no relation to the respiratory system; the sound in some of the large southern individuals continues for nearly a minute. Other harvest flies of the same family, but principally of the genus *membracis* (Fabr.), have only two eyelets; they are not furnished with a musical apparatus, but have the faculty of leaping a distance of 5 or 6 ft.;



European Harvest Flies.—1. *Cicada plebeia*. 2. *Cicada orni*.

they are more properly called tree-hoppers. For full details and references in regard to the American *cicadada*, the reader may consult Dr. Harris's work on "Insects Injurious to Vegetation."—The European species do not pass more than a year in their subterranean abode. The *C. plebeia* (Linn.) is the largest, and is probably the one sung by poets of antiquity, especially by Anacreon and Virgil. These insects were so highly esteemed by the Athenians that they wore golden images of them in their hair; they, however, were also esteemed as food, just before the conclusion of the nymph state; they are said to be sold in South American markets, and, freed from the head, wings, and legs, to be roasted and ground into flour. More than 60 species have been described, spread over almost all the warm regions of the earth. The *C. plebeia* is black, with reddish spots on the thorax and wing covers. The *C. orni*, common in central and southern Europe, is about an inch long, yellowish mixed with black; by their wounding certain species

of ash tree (*ornus*), a saccharine fluid escapes, which, dried and hardened, is used in medicine as manna; this hint from the insect has been taken advantage of by man, who, by making incisions in the trees, is able to obtain a large supply of this purgative substance.

HARVEY, a S. central county of Kansas, recently formed, and not included in the census of 1870, intersected by the Little Arkansas river, and watered by affluents of Whitewater creek; area, about 450 sq. m. The Arkansas touches the S. W. corner. The Atchison, Topeka, and Santa Fé railroad and Wichita branch traverse it. Capital, Newton.

HARVEY, Sir George, a Scottish painter, born at St. Ninian's, near Stirling, in 1805. He was one of the founders of the royal Scottish academy. His pictures represent scenes from Scottish history and domestic life, and particularly those relating to the trials and persecutions of the Covenanters. In some, however, the serious character is relieved by a vein of quaint humor characteristic of the artist's nationality. He has also painted landscapes with effect. Among his works are "Covenanters Preaching" (1830), "The Curlers" (1835), "The Past and Present" (1840), "A Highland Funeral" (1844), "John Bunyan and his Daughter selling Laces at the Door of Bedford Jail" (1857), and "The Penny Bank" (1864). He was elected president of the Scottish royal academy in 1864, and was knighted in 1867. He has published "Notes of the Early History of the Royal Scottish Academy" (1870).

HARVEY, William, an English physician, discoverer of the circulation of the blood, born in Folkestone, Kent, April 1, 1578, died in London, June 3, 1657. He was the eldest of a family of nine children, and at 10 years of age was sent by his father to the grammar school in Canterbury, whence in 1593 he went to Caius college, Cambridge. Having taken his degree of B. A., he repaired about 1598 to the university of Padua, where he attended the lectures of Fabricius ab Aquapendente and other eminent professors of medical science, and in 1602 graduated as doctor of medicine. Returning to England, he settled in London, and in 1607 was admitted a fellow of the royal college of physicians. Two years later he was appointed physician to St. Bartholomew's hospital, a post which he filled uninterruptedly till 1644, and in 1615 became lecturer on anatomy and surgery in the college of physicians. It was in 1619, while he was discharging the duties of this latter office, that the discovery with which his name has since been associated is supposed to have been made, although, from his desire to thoroughly confirm and mature his opinions, the published treatise on the subject, entitled *Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus*, and dedicated to Charles I., did not appear till 1628 (4to, Frankfurt). Harvey, it is said, expressed himself indebted to his former master, Fabricius, for his discovery; but beyond the inductive method of

research which led to it, and which he acquired from the teachings of the Paduan professor, and the discovery by the latter of the valves in the veins, the merit is undoubtedly his own. It appears certain, however, that Cæsalpinus, who died at Rome about the time that Harvey left Italy, distinctly stated in one of his works the system of the circulation of the blood. (See CÆSALPINUS.) For two years previous to the death of James I. Harvey was the royal physician extraordinary, and in 1632 Charles I. appointed him his physician in ordinary. He was thenceforth intimately connected with the court, and frequently prosecuted his anatomical experiments in the presence of the king, whose fortunes he followed after the commencement of the revolution, and with whom he was present at the battle of Edgehill. He subsequently retired with the king to Oxford, where he was made warden of Merton college and received the degree of M.D., and where he remained until the surrender of the city to the parliamentary forces. Ever more interested in the advancement of science than in the mutations of political strife, he devoted himself while there to researches on generation, a subject which had engaged his attention for some years previous, and upon which he published in 1651, five years after his return to London, his second important work, *Exercitationes de Generatione Animalium*. His adherence to the royal cause had meanwhile lost him his position as physician to St. Bartholomew's hospital; but he continued to discharge his functions as lecturer at the college of physicians until near the close of his life. In 1652 he received the rare honor of having his statue placed in the college hall, with an inscription testifying to the value of his discoveries. He subsequently built an addition to the college and endowed it with his paternal estate, one of the conditions of the grant being that an oration should be delivered annually in commemoration of the benefactors of the college, and an "exhortation to the members to study and search out the secrets of nature by way of experiment, and for the honor of the profession to continue mutually in love." Three years before his death he was elected president, but declined the office on account of his advanced age.—For many years Harvey experienced the treatment with which all innovators or discoverers are familiar, and complained that his practice declined considerably after the publication of his treatise on the circulation of the blood, a result which he had indeed predicted. He was far, however, from being looked upon as an empiric; and notwithstanding the hostility of some eminent continental professors and of the older members of the profession generally, he enjoyed the intimacy of the king, and of Bacon, Hobbes, Cowley, and other persons of note in England, several of whom were his devoted partisans. He, moreover, lived to be considered as the first anatomist and physician of his time,

and to see his discoveries universally acknowledged. He was a man of even temper, and in his controversy on the doctrine of circulation with Riolanus, professor of anatomy in Paris, the only one in which he personally engaged, exhibited a forbearance, modesty, and discretion eminently worthy of imitation. Harvey's works, which are written in Latin, display elegant scholarship, and occasionally a considerable degree of eloquence. The best edition, published by the college of physicians in 1766, and preceded by a life of the author in Latin by Dr. Lawrence, contains, in addition to his works above enumerated, his reply to Riolanus, an anatomical account of Thomas Parr, who died at the age of 152, and nine letters on anatomical subjects. During the civil war his house in London was pillaged, and a number of valuable manuscripts were destroyed, the loss of which he never ceased to deplore. The library of the British museum possesses two manuscript works by him, *De Musculis et Motu Animalium* and *De Anatomia Universali*; the latter, dated April, 1616, contains the germ of the doctrine of circulation. The most recent publication of Harvey's works is the translation by R. Willis, M. D., brought out under the auspices of the Sydenham society (8vo, London, 1847).—For authorities concerning his life, see Lawrence's memoir, Sprengel's "History of Medicine," Aikin's "Biographical Memoirs of Medicine in Great Britain," "Lives of British Physicians" in Murray's "Family Library," &c.; and for a notice of his discoveries, see *CIRCULATION*, and *EMBRYOLOGY*.

HARVEY, William, an English engraver and designer, born in Newcastle-on-Tyne about 1800, died Jan. 13, 1866. At the age of 14 he was apprenticed to Thomas Bewick, and in 1816 went to London and put himself under the instruction of Haydon, whose "Dentatus" he engraved on wood. From 1840 he almost exclusively devoted himself to designing for wood engraving, and produced an immense number of works. Many important publications were illustrated by him, including Lane's translation of the "Arabian Nights," the "Pilgrim's Progress," Northcote's "Fables," and Knight's "Pictorial Shakespeare." His style is original, but has occasional mannerisms.

HARWICH, a seaport of Essex, England, situated on a point of land opposite the confluence of the Orwell and Stour, 66 m. N. E. of London; pop. in 1871, 6,107. The harbor is one of the best on the E. coast of England, being completely sheltered, and having water sufficient to float the largest ships of war. Hundreds of colliers and other vessels anchor here during the prevalence of N. E. winds. It is defended by three forts and a redoubt, with a moat and drawbridge. Two fixed lights indicate the entrance, which is encumbered with rocks, and dangerous without a pilot. Steam packets sail regularly between Harwich and Antwerp, in connection with the Great Eastern railway. Ship building, and other employ-

ments connected with maritime affairs, occupy a great portion of the population. Harwich has become a place of fashionable summer resort, as it is surrounded by beautiful scenery and affords sea bathing. The town is of Saxon origin. In 1318 it was incorporated by Edward II., and in the campaign of 1346-'7 it supplied 14 ships to the fleet of Edward III.

HARWOOD, Edward, an English author, born in Lancashire in 1729, died in London, Jan. 14, 1794. He was educated for the ministry, and in 1765 took charge of a small Unitarian society in Bristol. At the end of five years, in consequence of charges affecting his religious opinions and private character, he was induced to go to London, where he passed the remainder of his life. He published "A Liberal Translation of the New Testament" (2 vols., 1767); "Introduction to the Study of the New Testament" (2 vols., 1767-'71); "View of the various Editions of the Greek and Roman Classics" (1775); and "The New Testament collated with the most approved MSS., with Select Notes in English, Critical and Explanatory" (2 vols., 1776).

HASDRUBAL, or *Asdrubal* (in Punic, probably, "he whom Baal aids"), the name of a number of Carthaginian naval and military commanders, celebrated in the history of the three Punic wars, of whom the following are the most distinguished: **I.** Son-in-law, and successor in the command in Spain, to the great Hamilcar Barca, after whose death in 229 B. C. he continued his operations with the assistance of the young Hannibal, founded New Carthage (now Cartagena, in Murcia), and concluded a treaty with the Romans, which made the Ebro the boundary of the Roman and Carthaginian possessions in the peninsula. He was killed by a Gallic slave in revenge for the death of his master, and was succeeded in command by Hannibal (221). **II.** Son of Hamilcar, was left in Spain when his brother Hannibal started on his expedition across the Pyrenees and Alps to Italy (218). Being afterward prevented from following him by a defeat on the Ebro which he suffered from an army under Publius and Cneius Cornelius Scipio, he fought in Africa against Syphax, king of a Numidian tribe, and again in Spain, where he was successful against his former adversaries, both of whom fell (211). Two years later he was defeated by the son of Publius, the afterward renowned Scipio Africanus, though he could not be prevented from crossing the Pyrenees while hastening to the assistance of his brother in Italy. Arrived in Umbria, he lost his army and life on the banks of the Metaurus, between the modern Pesaro and Sinigaglia, being defeated by the Romans under C. Claudius Nero and M. Livius (207). His head is said to have been cut off and thrown into Hannibal's camp. **III.** Son of Gisco, commander in the second Punic war, fought in Spain, 214-206 B. C., was defeated together with Mago by P. C. Scipio toward

the end of this period, and retired to Africa, where by giving to Syphax his daughter Sophonisba, already promised to Masinissa, he caused the enmity of Masinissa to the Carthaginians. Together with Syphax he was twice defeated by Scipio, who had landed in Africa in 204. The condemnation to death pronounced against him by the irritated people, which did not deter him from continuing in arms against the enemies of his country, was reversed after the arrival of Hannibal. Finally, however, being driven to despair by the public hatred, he terminated his life by poison.

IV. Commander against Masinissa and in the third Punic war, when he twice defeated the Roman consul Manilius, bravely opposed Scipio Africanus the younger, and after the taking of Carthage by the latter retired into the citadel, and finally, with a small number of his own troops and a host of deserters, to the temple of Æsculapius. Further resistance being impossible, he secretly went over to the camp of Scipio to implore his mercy. The conqueror spared his life, but showed him to the deserted defenders of the temple, and he saw his wife throw her children and then herself into the flames of the burning edifice. Having adorned the triumph of Scipio, he spent the remainder of his life as a captive in Italy.

HASE, Karl August, a German theologian, born at Steinbach, Saxony, Aug. 25, 1800. He studied theology at the universities of Leipsic, Erlangen, and Tübingen, was imprisoned for five months in 1819 on account of his participation in the movement of the *Burschenschaft*, became *Privatdocent* of theology at Tübingen in 1823, professor of philosophy at Leipsic in 1829, and professor of theology at Jena in 1830. For many years he took a prominent part in the theological disputes of the day, and in 1844 became one of the editors of the *Protestantische Kirchenzeitung* of Berlin, the organ of the German rationalists. His works are very numerous, and several of them have passed through many editions. Among them are: *Lehrbuch der evangelischen Dogmatik* (1825; 6th ed., 1870); *Gnosis* (3 vols., 1827-'9; 2d ed., 1870); *Hutterus Redivivus, oder Dogmatik der evangelischen Kirche* (1829; 10th ed., 1862); *Das Leben Jesu* (1829; 5th ed., 1865; translated by James Freeman Clarke, Boston, 1859); *Kirchengeschichte* (1834; 9th ed., 1867; translated by C. E. Blumenthal and C. P. Wing, New York, 1856); *Neue Propheten* (1851); *Franz von Assisi* (1856); *Das geistliche Schauspiel* (1858); *Der Papst und Italien* (1861); *Polemik gegen die römisch-katholische Kirche* (1862; 2d ed., 1871); and *Ideale und Irrthümer* (1872).

HASENCLEVER. I. Peter, a German manufacturer, born at Remscheid, Rhenish Prussia, Nov. 24, 1716, died in Landshut, Prussian Silesia, June 13, 1792. Frederick the Great had a high opinion of his business capacity, and was in the habit of consulting him. In 1765 he established a house in New York for the sale of

hemp, potash, and iron. Having become bankrupt by the mismanagement of a partner, he returned to Europe, and carried on a large linen trade in Landshut until his death. He was the author of "Letters from Philadelphia" in the correspondence of Schlözer, part 35 (1780), and of a "Description of the City of New York," in the commercial notices of Sinapius, part 4 (1781). **II. Johann Peter**, a German painter, of the same family with the preceding, born at Remscheid, May 18, 1810, died in Düsseldorf, Dec. 16, 1853. He was educated at Düsseldorf under Schadow, and subsequently at Munich. Among his works, a series entitled the "Jobsiad" are well known.

HASENPFUG, Karl Georg Adolf, a German painter, born in Berlin, Sept. 23, 1802, died April 13, 1858. He was the son of a shoemaker, and learned his father's trade, but obtained admission to the studio of the decorative painter Gropius, where he attracted the notice of King Frederick William III. He executed paintings of the cathedrals of Halberstadt, Magdeburg, Erfurt, Bamberg, and several others; and in 1830 he was placed in charge of the restoration of the Magdeburg cathedral. In 1835 he took up his residence in Cologne, to make a special study of the cathedral, which he represented from without and within in two large paintings. In his many representations of German mediæval architecture he brought into view the picturesque side of that art. His paintings have been carried to Belgium, England, and America.

HASHISH. See **HEMP**.

HASKELL, a N. W. county of Texas, watered by the head streams of the Brazos river; area, 1,275 sq. m.; still unsettled. It consists mostly of high prairie land, of little value except for grass. Antelopes and prairie dogs abound.

HASLAM, John, a British physician, born in Edinburgh in 1763, died in London in July, 1844. He was educated at Cambridge, and studied medicine in London, where he became intimate with John and William Hunter. He was for many years apothecary to Bethlehem insane hospital, afterward resided several years in Edinburgh, and returning to London, soon attained a large practice there. In 1827 and 1828 he delivered courses of lectures on the intellectual composition of man. His works are: "Observations on Insanity" (1798); "Illustrations of Madness" (1810); "Considerations on the Moral Management of Insane Persons" (1817); "Medical Jurisprudence as it relates to Insanity, according to the Law of England" (1818); "A Letter to the Governors of Bethlehem Hospital" (1818); "Essay on Sound Mind" (1819); and "Lectures on the Intellectual Composition of Man" (1827-'8).

HASLINGDEN, a market town of Lancashire, England, 16 m. N. W. of Manchester; pop. in 1871, 12,201. It has a handsome parish church of modern date with the exception of the tower, which belonged to a building erected in the time of Henry VIII. The woollen manu-

facture, formerly the staple of the town, is now supplanted by that of cotton. Excellent building stone, slate, and flags abound in the neighborhood, and there are several coal mines.

HASSE. I. **Friedrich Christian August**, a German historian, born at Rehfeld, near Herzberg, Jan. 4, 1773, died in Leipsic, Feb. 6, 1848. He was a professor at the military academy of Dresden and at the university of Leipsic, and edited the *Leipziger Zeitung* from 1830 till his death. He succeeded Friedrich Arnold Brockhaus in 1823 as editor of the *Neue Folge des Conversations-Lexikon*, editing also the 6th and 7th editions of that cyclopædia. Besides many other works, he published *Geschichte der Lombardei* (4 vols., Dresden, 1826-'38). II. **Friedrich Rudolf**, son of the preceding, born in Dresden, June 29, 1808, died in Bonn, Oct. 14, 1862. He studied theology in Berlin, became professor in 1836 at Greifswald, and in 1842 at Bonn, where he was made consistorial councillor in 1853. His principal works are *Anselm von Canterbury* (2 vols., Leipsic, 1843-'52), and the posthumous *Geschichte des alten Bundes* (1863) and *Kirchengeschichte* (3 vols., 1864). III. **Karl Ewald**, a German physiologist, brother of the preceding, born in Dresden, June 23, 1810. He graduated at Leipsic, and has been professor there and at Göttingen. His *Anatomische Beschreibung der Krankheiten der Circulations- und Respirationsorgane* (Leipsic, 1841) has been translated into English and Dutch, and his *Krankheiten des Nervenapparats* (Erlangen, 1855) constitutes vol. iv. of Virchow's *Handbuch der Pathologie und Therapie*.

HASSE, Johann Adolf (called in Italy *Il Sassone*, the Saxon), a German composer, born at Bergedorf, near Hamburg, March 25, 1699, died in Venice, Dec. 23, 1783. He was a pupil of Porpora and Scarlatti. His opera *Sesostrate*, produced at Naples in 1726, established his reputation; and after giving several other works to the Italian stage, the success of which was insured by the coöperation of his wife, the celebrated singer Faustina, he accepted the office of chapelmaster and composer to the elector of Saxony. In 1733 he was invited to London to compete with Handel, and brought out his *Artaserse*, in which Farinelli made his début before an English audience. Although the opera was performed 40 nights, Hasse, disgusted with the virulence of the musical cabals, left London, and about 1740 established himself in Dresden. Upon the bombardment of that city in 1760 he lost all his musical manuscripts. He then went to Vienna, and the last years of his life were spent in Venice. Dr. Burney considered Hasse the most learned, natural, and elegant composer of his age. His works, including all the libretti of Metastasio, were so numerous that it is said he often failed to recognize his own music.

HASSELQUIST, Fredrik, a Swedish naturalist, born at Törnvala, East Gothland, Jan. 14, 1722, died in Smyrna, Feb. 9, 1752. He studied under Linnæus at the university of Upsal. Having obtained a royal stipend to travel and

study abroad, he proceeded in 1749 to the East, although warned by Linnæus that his constitution was too feeble. After visiting parts of Asia Minor, Egypt, and Palestine, he died on his way home. Linnæus in 1757 published the results of his pupil's investigations in a work entitled *Iter Palæstinum*, of which an English translation was published in 1766 (8vo, London).

HASSELT, a town of Belgium, capital of the province of Limburg, on the Demer, 42 m. E. N. E. of Brussels, and 20 m. W. N. W. of Maestricht, with which it is connected by railway; pop. in 1866, 10,448. It is fortified and well built. The chief manufactures are tobacco, madder, soap, oil, linen, and leather.

HASTING, or *Hastings*, a Scandinavian viking, or sea rover, born about 812, some say in Scandinavia, others in Normandy, others at Tranquilla (modern Trancost) on the Seine. He attached himself to a band of Northmen who had established themselves on the island of Bièse, over whom he soon gained the chief command on sea and land. His first achievement was the devastation of the banks of the Loire as far as Tours (about 845). He next undertook an expedition against Spain; but meeting a repulse at Corunna, he retraced his course toward France, sacked Bordeaux, and carried fire and sword as far as Toulouse and Tarbes. The people of the latter city celebrate to this day the anniversary of a victory gained by their forefathers over Hasting on May 21. Refitting at the mouth of the Adour, he sailed again for the coast of the peninsula, took Lisbon, pillaged the city for 13 days, burned Seville, and marched upon Cordova, but was arrested by the allied forces of the Moors and Christians. Returning with reinforcements, he destroyed the great mosque of Algeciras and compelled Alfonso the Great, king of Leon, to seek refuge at Oviedo. Majorca, Minorca, and Provence, in their turn, became also the scenes of Hasting's incursions. He next made a descent upon Tuscany, and planned a voyage to Rome. Steering along the coast into the bay now known as the gulf of Spezia, he descried a city (Luna, now Luni). Not doubting that he was approaching Rome, he disembarked his troops, and sent ambassadors to say to the emperor, as he supposed, that, fresh from the conquest of France, he desired only to obtain supplies and means to refit his fleet. For himself, weary of a roving life, he sought to lay down his command and thenceforth to repose in the bosom of the church. The count of Luna and the bishop came out to meet him, and administered baptism, but declined to admit him or any of his followers within the city walls. Hasting then feigned death; and a vast funeral train, passing into the city, deposited the bier before the cathedral altar. The chief then sprang up and struck the bishop to the earth; and the mourners, throwing off their long robes, cut their way back to the city gates, and let in their comrades. The city was won, but Hasting soon learned to his surprise that he

was not master of Rome. After other exploits he once more appeared upon the coast of Normandy. Count Robert of Anjou and the duke of Aquitaine surprised him at Brisarthe, near Angers, from which place, after a furious battle, in which both the Frankish leaders were slain, Hasting ascended the Loire, plundered every town on its banks, and sailed for England to join a Danish invasion. Repulsed by Alfred the Great, he reappeared upon the Loire, and wrung from Charles the Fat possession in perpetuity of the county of Chartres. He now sought a home in Denmark, where at a great age his identity is lost in the confusion of the chronicles, which attribute to him the subsequent exploits of a number of vikings who assumed his name.

HASTINGS, a municipal and parliamentary borough of Sussex, England, 54 m. S. S. E. of London, with which it is connected by railway;

of a nation by a nation," says Macaulay, speaking of the consequences of the battle, "has seldom, even in Asia, been more complete." Upon the battle field the conqueror within two years founded the "abbey of bataille," and the name of Senlac was changed to that of Battle, which the place still bears. The victorious army numbered 60,000 men, more than one fourth of whom were left on the field; the number of the vanquished and their loss are unknown.

HASTINGS, a central county of Ontario, Canada, bordering on the bay of Quinté, an inlet of Lake Ontario; area, 2,337 sq. m.; pop. in 1871, 48,364, of whom 20,408 were of Irish, 11,543 of English, 5,968 of German, 5,120 of Scotch, 2,785 of French, and 1,547 of Dutch origin or descent. The surface is interspersed with small lakes and rivulets. Gold is found in the interior. The county is traversed by the Grand Trunk railway. Capital, Belleville.

HASTINGS, a city and the capital of Dakota co., Minnesota, on the right bank of the Mississippi river, at the mouth of the Vermilion, and about 5 m. above the mouth of the St. Croix, 20 m. E. S. E. of St. Paul; pop. in 1860, 1,653; in 1870, 3,458. Railroad communication is furnished by the Chicago, Milwaukee, and St. Paul, and the Hastings and Dakota lines. The Vermilion here falls 110 ft. in half a mile, and furnishes abundant water power. The principal manufactories are four flour mills, a saw mill, and a shingle mill. The city has a three-story



Battle Abbey, Hastings.

pop. of the town in 1871, 29,289; of the borough, 33,335. Hastings is one of the cinque ports, and is pleasantly situated on the coast, being sheltered on three sides by hills and cliffs. It consists of an old and a new town. The trade is inconsiderable. Crowds of visitors flock to it during the bathing season.—The battle of Hastings, between William of Normandy and Harold, king of the Anglo-Saxons, was fought on Oct. 14, 1066, at Senlac, six miles from Hastings. The Normans, formidable by their cavalry and bowmen, advanced to the attack, and were met by the Anglo-Saxons with their battle axes, the Kentish men in front. The battle continued from 9 o'clock in the morning till sunset, and the Anglo-Saxons suffered severely by advancing to pursue the Normans, who feigned retreat; yet they maintained their position till Harold fell pierced by an arrow. Then their efforts immediately relaxed, and they dispersed at dusk. "The subjugation

brick hotel, a large central school house, containing the high school, and having eight teachers, three school houses with one teacher each, a Catholic school and a second in course of erection, a national bank, two weekly newspapers, and eight churches.

HASTINGS, Francis Rawdon Hastings, marquis of, an English soldier, born Dec. 9, 1754, died in the bay of Baja, near Naples, Nov. 28, 1826. He was educated at Oxford, and at the age of 17 entered the army as ensign in a foot regiment. In 1773 he was sent with his regiment to America, and two years later, as captain in the 63d foot, participated in the battle of Bunker hill. In 1778 he was appointed adjutant general of the British forces in North America, with the rank of lieutenant colonel. His good conduct at the battle of Monmouth in the same year procured him the command of a British corps in South Carolina, which he led at the battle of Camden (Aug. 16, 1780), and with which he

subsequently defeated Greene at Hobkirk's hill. Returning to England before the close of the war, on account of ill health, he was captured by a French cruiser. Soon after his release he was created Baron Rawdon and honored with several marks of distinction by the king; and in 1793 he succeeded his father as earl of Moira. In the succeeding year he commanded a body of 10,000 men sent to relieve the duke of York in Flanders, which service he successfully performed. After various other services, he was in 1806 appointed master general of the ordnance in the Grenville and Fox ministry, and after the assassination of Mr. Perceval in 1812 made an unsuccessful attempt to form a cabinet. Shortly after he was appointed governor general of India, where he remained till 1823. The most important event of his administration was the successful termination of the Nepal war. He was subsequently governor of Malta. In December, 1816, he was created Viscount Loudon, earl of Rawdon, and marquis of Hastings.

HASTINGS, Warren, governor general of British India, born Dec. 6, 1732, died Aug. 22, 1818. He was descended from the Hastingses of Daylesford, Worcestershire, but the estate had been sold, and of all their ancient possessions the grandfather of Warren held only the rectory of Daylesford, to which he had been presented by his father. He had two sons, Howard, who held an office in the customs, and Pynaston, the father of Warren. Pynaston, at the age of 15, imprudently married Hester Warren, the daughter of a small farmer, and being in great poverty abandoned his native country, leaving two children to the care of his father. The rector, impoverished by a lawsuit, left Daylesford, and became curate at Churchill, where Warren was sent to the charity school of the village. In 1740, his uncle Howard having taken charge of his education, he went to a school at Newington, where he was well taught but badly fed; to the latter circumstance he was accustomed to attribute his diminutive stature and feeble health. At the age of 10 he was removed to Westminster. Here his mental powers became conspicuous, and at 14 he stood first among his competitors, and was already distinguished for ambition, resolution, and industry. His uncle dying, he was now left dependent upon a distant relative, who procured for him a writership in the East India company. In January, 1750, he went to India. Here he at once began to study the native languages, and was one of the first to make himself familiar with the history and literature of the people among whom he now lived. He was soon noticed by Lord Clive, and was employed in various commercial and diplomatic measures. In 1756 he married the widow of Capt. Campbell, who, together with the two children she had borne him, died before his return to England. He remained in India 14 years, not distinguished in any remarkable manner, but acquiring knowledge and highly esteemed. In 1764 he arrived in Eng-

land with a moderate fortune, which was soon exhausted by his liberality to his needy relatives and his profuse generosity. His talents and his knowledge of East Indian affairs soon brought him again into the service of the company. In 1769 he returned to India, and was made second in the council of Madras, and in 1772 he became the highest official of the company, the president of the supreme council of Bengal. His power was next enlarged by a change made in the Indian constitution by an act of parliament, which consolidated the separate governments into one, and Hastings became (Jan. 1, 1774) governor general of British India. The vast territory over which he ruled was composed of new conquests; the English were few in number, and their supremacy was constantly endangered by Hyder Ali, rajah of Mysore, by the Mahrattas, and by other native powers. In these dangers the administrative talent and unwearying constancy of Warren Hastings established the British empire in India. He was unscrupulous, resolute, and apparently cruel; he perhaps depopulated whole districts by his exactions, and committed acts of signal injustice. But success followed him; he defeated opposition in his council, and destroyed his Indian foes. He was not however sustained by the home administration, nor by the board of directors. Rumors of his tyranny in India were assiduously spread over England by his enemies, but the court of proprietors sustained him by large majorities whenever the attempt was made to remove him from his office. Encouraged by their support, he now neglected or refused to obey the orders of the board of directors whenever he thought them impolitic, overawed the minority of his council, and ruled with a power almost unchecked, until February, 1785, when he resigned his office, and set out for England, not unconscious of the danger that threatened him there. He left India, it is said, highly popular with the natives as well as the English residents, and followed by general regret. Upon his arrival in England, the opposition in parliament, led by Edmund Burke, introduced a resolution for an inquiry into his conduct, but the proceedings did not commence until the session of 1786, when Burke brought forward his articles of impeachment. Mr. Pitt, intimidated by the unpopularity of the accused, consented to the measure, and gave up Hastings to the opposition. In the impeachment Burke charged him with numerous acts of oppression, with desolating whole regions of British domain, with speculation and corruption, with exciting useless wars, and with various acts dishonoring the British name. He divided his charges into four heads, namely, the oppression and final expulsion of the rajah of Benares, the cruel treatment of the begums or princesses of Oude, unfair contracts, and wasteful expenditure. The sessions of 1786-'7 having been consumed in preliminary measures, the house of lords met

in Westminster hall, Feb. 13, 1788, to hear the impeachment. The hall was richly adorned, and a distinguished assembly of royalty and nobility, of men of genius, of influence, and of fame, gathered to hear the trial. Hastings, frail, small, sickly, but still resolute, knelt at the bar, and then heard without exhibiting any emotion the terrible denunciations of his accusers. On the 15th Burke, in the name of the commons of England, opened the charge in a speech which lasted three days. He was assisted by Fox, Sheridan, Grey, and others, and also in private by Sir Philip Francis. During the sessions of 1788-90 the prosecution presented its charges. In 1791 the commons, to shorten the trial, were willing to withdraw some of the articles, and on June 2, the 73d day of the proceedings, Hastings began his defence. This continued until April 23, 1795, on which day, the 148th, he was acquitted by large majorities on each separate charge. Public opinion had turned in his favor, and his acquittal was approved by a majority of his countrymen. He convinced the nation that his measures had secured its prosperity, and showed by his poverty that he had not amassed wealth in his government. The expenses of the trial, £76,000, had consumed all his fortune. In March, 1796, the East India company granted him an annuity of £4,000 for 28½ years, and lent him £50,000 for 18 years without interest. He now purchased the Hastings estate at Daylesford, and retired from political life, occupying himself in rebuilding the family mansion, and in agricultural pursuits, seeking to naturalize in England the plants and animals of India. During his second voyage to India he had become acquainted with the baron and baroness Imhoff, who were his fellow passengers. The baroness attended him during a severe illness on shipboard, and about a year after his arrival in India, the baron having by agreement procured a divorce, his wife became Mrs. Hastings. This lady, who was accomplished and attractive, always preserved his regard, and now presided over the hospitalities of Daylesford. Hastings had long aspired to a peerage, but never received any higher public honor than an appointment as privy councillor, a short time before his death. He was however treated with the most distinguished respect by both houses of parliament when in 1813 he appeared at the bar of the commons as a witness on Indian affairs. In private life Warren Hastings displayed many virtues. He was generous, unselfish, hospitable, and a steady friend. He was a good scholar, and wrote with readiness and force. He encouraged among his countrymen the study of the Indian languages and history. He was for a time president of the Asiatic society, promoted geographical research, invited learned Hindoos to settle in Calcutta, founded colleges for the instruction of the native youth, and urged upon them the necessity of becoming familiar with the language, literature, and science of

England. In his political conduct he is generally allowed to have shown remarkable ability. Macaulay says that he administered government and war with more than the capacity of Richelieu; and Mill, the historian of British India, thinks him the most eminent of the chief rulers of the East India company.

HAT, a covering for the head. From the most remote times man has made use of a head covering of some kind. The most ancient form probably is the cap, such as is seen in figures representing the goddess of liberty. The ancient Greeks had several other kinds of head dress, the names and appearance of which have been preserved in their writings and on engraved gems. According to Strutt, the *pileus* was a woollen cap, which was sometimes worn as a lining to the helmet; and he quotes several Latin authorities to show that it was adopted by the Romans at the public games and festivals, by those who had been slaves, and by the aged and infirm for the sake of its warmth. It is supposed to have been made of felt, in some of its forms not unlike hats of the same material at the present day. When conical it was the *apex* of the Roman priests, worn probably from the time of Numa; with an elevated crest pointed forward like the liberty cap, it was the Phrygian or Mysian bonnet; with a brim, it became the *petasus*, a hat much like the round felt hats now worn. Among the Romans the cap was a symbol of liberty, and slaves were presented with one on receiving their freedom. After the assassination of Cæsar coins were issued by Brutus and Cassius on which was represented a cap between two daggers; and after Nero's death many Romans put on caps in order to proclaim the restoration of their liberties. Even at a later period the cap or hat was identified with liberty, as in the republic of the Netherlands after the emancipation from Spain, when a hat became the national emblem. The first hatters in the middle ages appeared in Nuremberg in 1360, under the name of *Felzkappenmacher* (manufacturers of felt caps); in France, under the reign of Charles VI., 1380-1422; and in 1401 in Würzburg, Bavaria. Charles VII., in a picture of his entrance into the city of Rouen in 1449, is represented as wearing a felt hat. The early Anglo-Saxons were generally no other covering for the head than the long flowing hair they sedulously cultivated. The few examples of caps are simple in form and scanty in dimensions. About the 8th century they wore caps resembling the Phrygian bonnet. "Those of the lower class of people," says Strutt, "appear rough behind, and probably were composed of the skin of some animal dressed with the hair upon the hide, and the shaggy part turned outward. When the men of quality wore this kind of covering, it was usually enriched with some species of ornament. Another cap, in the form of a perfect cone, was worn occasionally by the nobility." Speaking of the head dress in use in the 9th century, the

same author observes: "The hat was, I doubt not, made of various materials, and by no means seems to be a part of dress universally adopted; from its general appearance I have supposed it to have been made of skins with the shaggy part turned downward, and probably it might often be so; but they had also felt or woollen hats at this period (*fellen hat*), which their own records testify." About the middle of the 12th century one of the "nobels of the lande mett at Clarendon" is described by Froissart as wearing "a hatte of biever." The hat being the most conspicuous article of dress, and surmounting all the rest, it was natural to give it to special care and attention, to place in it showy plumes and jewels, and surround it with bands of gold and silver. To it were attached ornamental rosettes, sometimes designed as badges of honor or of office. Its form and sometimes color were also made to designate the rank and character of the wearer, as the monarch by his crown, the cardinal by his red hat, betokening a readiness to spill his blood for the sake of Jesus Christ, and the court fool by the cap with a bell. In one form it served to distinguish the military officer, and in another the peaceful Quaker. Among the great variety of hats used by the English, the forms of which are preserved in old pictures, none combine the grace, elegance, and comfort of the soft hat of the Spaniards, which the latter have retained while the fashion of the English hat has been continually changing. The manufacture of hats has been carried to perfection in the United States, where it was introduced at an early date. The representations made by the London board of trade to the house of commons in 1732 refer to the complaints of the hatters in London at the extent to which the manufacture was carried on in New England and New York.—Without including caps and straw hats, the kinds in general use may be classed as those which are felted throughout, and those which are made with a covering, usually of silk plush upon a prepared stiff body. In the former class are included the coarse qualities made entirely of wool mixed with hair and stiffened with glue; those called plated, which are furnished with an external pile or nap of finer material than the body, and sometimes water-proof stiffened before the nap is put on; and those called short naps, in which some of the better class of fur is worked in the plating or nap, and all are water-proof stiffened. Beaver hats, formerly esteemed the best of all hats, had merely a nap of the fur of the beaver, which was felted into the body; the best hats being finished with the finest fur taken from the belly and cheeks of the animal, and the inferior qualities with that from the back. The soft genuine beaver hats, now rarely seen, were made upon a body of rabbits' fur. As beavers' fur became scarce, nutria was substituted for it, also the fur of the musquash, hare, and rabbit; and for the body lambs' wool and that of the llama were used

instead of rabbits' fur. Furs intended for felting are prepared in different ways. Hare skins are split open, then rubbed with a jagged knife blade called a rake to remove bits of fleshy matter adhering to the pelt. They are next damped on the pelt side with water, and being placed together in pairs, pelt to pelt, are pressed. They are thus made smooth and ready for shearing, by which the long coarse hairs are clipped close down to the fur. The angular projections and edges of the pelt are then trimmed off, a process called rounding. The fur was formerly cut from the skins by hand, and this method is still practised among some of the smaller European manufacturers; but by the principal manufacturers, and in America by all, it is now cut by machines of American invention. The skin is held horizontally with the fur side down, a narrow edge of the pelt being pushed over a horizontal bed knife, which presses back the fur. Behind this bed knife a cylinder, provided with knives set obliquely, revolves with great rapidity. The edge of the pelt is caught between the descending knife and the bed knife, and cut off as by a pair of scissors; the line of fur attached to the strip is thus severed at the roots and falls on a surface placed to receive it. As strip after strip of pelt is thus cut off, the fur continues falling till the whole fleece lies compactly together. Rabbit skins are treated in a similar way, except that the long hairs, instead of being clipped, are pulled by catching each one between a knife blade and the thumb, which is protected by a leather covering. Beaver and nutria skins require more care to remove the fatty and fleshy matters, and to cleanse them from grease, all which must be done before the long hairs are pulled. Nutria skins especially are loaded with fat upon the pelt, and the fur is filled with grease. Scrubbing with a brush and free use of soap and boiling water are necessary to remove the latter. Attempts have been made to remove the fur by chemical ingredients, but the effect of these has usually been to impair the felting property. But the application of dilute nitric acid to the fur before it is removed from the pelt is found to improve this property, probably by destroying the last traces of the grease. Skins that have been wetted with it are said to be "carroted," from the color it imparts; they should be immediately dried by exposure to the heat of a fire, or by smoothing with a hot iron and drying in the sun. Rabbit and hare skins by long keeping are very liable to suffer injury from moths and other insects, and the former, especially if kept in large heaps, from the running of the greasy matter among them, and becoming rancid, corroding the pelt itself. In England it is found that the strongest rabbit fur for felting is obtained from animals bred near the sea. The skins taken in the winter are far superior in quality to those obtained at other times, and are distinguished in the trade as seasoned, all others being called unseasoned.

The annual production of hatters' fur in the United States is about 500,000 lbs.; but the principal supplies come from towns on the North sea, from Frankfort, Brussels, and a few other places. The furs are obtained there in large quantities, and have the excellent quality of thickness due to a cold climate.—After the fur has been separated from the pelt it is first mixed, the different qualities together, and the finest carded cotton is added in the proportion of $\frac{1}{4}$ to $\frac{1}{2}$ oz. of cotton to 4 or 5 oz. of fur, the usual quantity required for a felt hat. The mixing is effected in a picking machine, into which it is drawn as fed, and, immediately seized by a toothed picker, which revolves with great velocity, creating a powerful current of air, it is tossed about in the capacious box forming the top of the machine, and carried as it falls upon an endless apron, which delivers it to a second pair of feed rollers and another picker, by which the operation is repeated. The fur discharged from this contains the long hairs and bits of pelt and other impurities, from which it is to be separated in the next process, which is called blowing. The machines for this are contained in a box sometimes 20 ft. long and about 7 high, in which case there are eight successive sets of the same apparatus of pickers and screens. As the fur is fed in at one end, it is taken by the feed rollers against the points of a cylindrical picker, which revolves several thousand times in a minute. This strikes out a large portion of the heavy hairs and coarse particles, and tosses the light fur into the upper portion of the box, where it is blown forward to the next set, in which it is subjected to a repetition of the same process. The coarser portions fall upon an inclined screen, which is kept in agitation. The loose hairs and refuse stuff fall through this, and the portion that is shaken off the screen is delivered back on the floor under the point of starting. As it collects it is taken up and sent through again. Much of the dust separates through the perforated sheet copper with which the machine is covered. The next process is to form the hat body; an operation that has been accomplished by various methods, as by bowing and working the fur together by hand, and thus felting it; also by what is called the pneumatic process, by which a mat is obtained that is afterward worked upon a block into the required shape. Thomas Blanchard of Boston several years ago, by exhausting the air under a fine wire gauze, caused the fur to be drawn together upon this and partially felted, in the form of a thin narrow ribbon. This was then wound upon a double cone of the size and form for two hat bodies. The next improvement was that of Henry A. Wells of New York in 1846, who invented the machine now in use. He made a cone of sheet copper punched full of round holes, and, setting it upright, caused it to revolve slowly upon its axis. Under this an exhausting fan is put in action, causing by its rotation of about 4,000 times in a minute a

current of air to draw through the holes from the outside. A trunk or box with a vertical opening directed against the cone discharges the fur, which is fed into it at the other end. Here it is received from the feeding apron in quantity just sufficient for one hat body. It is drawn in between two horizontal feeding rollers covered with felt, and immediately seized by a cylinder revolving about 3,600 times in a minute, and furnished with several longitudinal lines of stiff brushes. This generates a current of air, which scatters the fur, and blows it toward the mouth of the trunk, where it is rapidly drawn upon the perforated cone and evenly spread over the top and down the sides of the same, in quantity enough for one body in 16 revolutions. H. A. Burr improved the discharging trunk, so that it could be adjusted to deposit more or less fur on any desired portions of the cone. As the fur collects, the workman picks off any coarse particles that gather on the surface, and when the supply for one hat body is deposited he wraps a wet cloth over the cone, and slips a metallic cover over the whole, which he removes into a tank of hot water. A new cone is immediately set in its place to receive another coating of fur. The hot water makes the mat more tenacious. It is soon slipped off the cone, taken to a table, gently worked by hand-rolling in a piece of blanket, squeezed and pressed, and then folded into convenient shape. It is now ready to be pressed with others, to be made up into the bundles in which the bodies are sent to the hatters. The material has not yet assumed the form or size of a hat. It is a large open-mouthed bag, smaller and rounded at the closed end. In making the bodies by the old hand process, a man used to be occupied a whole day upon four or five. By the machine just described, and known as the "former," tended by two men and a boy, and employing another in rolling the bodies, 400 are completed each day, all of which are alike in shape, weight, and thickness. The cost of the labor on each is estimated at from 6 to 10 cts. The inferior bodies made by the old method cost for labor about 56 cents; their manufacture is now generally abandoned.—After the mats come into the hands of the hatters, they are reduced in size by sizing. This, which is entirely a hand process, consists in rubbing a pile of several bodies, first dipped into hot water and rolled in a piece of blanket, upon a sloping table, technically called a battery, which is arranged around a central caldron affording accommodation for from 8 to 12 workmen. By rubbing the bodies together for a short time they are reduced to about one third their original size, and the felt is rendered more compact. A skilful workman knows just how far to carry this process, which leaves the shells, as they are now called, uniform in thickness and size. They are then dyed of any desired color, after which they are blocked, which consists in stretching the cone-shaped shell over a wooden block of the shape

and size of the hat to be made. This was formerly done by hand, but is now effected by a patented machine called the Eickemeyer hat-blocking machine, invented by Rudolf Eickemeyer of Yonkers, N. Y., for the use of which a royalty of from 2 to 8 cts. per dozen is paid by all manufacturers. The next operation is pouncing, by which the rough surface of the hat is smoothed and all inequalities are removed. This also was formerly done by hand by two workmen, one shaving down the inequalities with a sharp knife, and the other smoothing the surface with sand-paper and pumice stone; but it is now performed by a patented machine in which the hat while revolving is brought into contact with a cylinder covered with emery paper. A royalty of 6 cts. per dozen for fur hats and 3 cts. per dozen for wool hats is paid by each manufacturer for the use of this machine, which was invented by Sidney S. Wheeler and Daniel D. Manley of Danbury, Conn. After pouncing the hat is again stretched on a block and pressed into shape with a hot iron. This is technically called finishing. If the hat is to be stiff, the next operation is curling, which consists in pressing the brim into shape with a hot iron. The trimming is done by girls, who put in the lining, the round top piece, technically called the tip, and the leather, and sew on the band and the binding. The binding is usually done with the sewing machine, but in some hats it has to be put on by hand. The last operation, called ironing off, is merely the running of a hot iron over the hat to press it into perfect shape, after which it is ready for the packing box. A cheaper quality of hat is made from felted wool, the manufacture of which is conducted in nearly the same manner. Wool hats, however, are sized or felted in a fulling mill. They are made entirely of wool in the United States, but in England a little fur is sometimes mixed with the wool.—Silk hats were formerly made of felt shells formed by the Wells machine, but the felt bodies are now almost entirely superseded by those made of muslin. The muslin is prepared by being stretched on frames and saturated with a solution of shell-lac in ammonia and water. For the brims of hats from two to six thicknesses are required; for the tops one or two thicknesses. After the several sheets are thoroughly rubbed together so that they adhere to each other, they are dried by the fire, after which another coat of shell-lac varnish is put on. When this is dry the muslin is removed from the frames and cut into the proper shapes for sides, tops, and brims. The several pieces are then fitted together over a block. The side is put on first, and then the top, the projecting edges of the latter being ironed down until they adhere firmly to the side. A strip of thin muslin, technically called robbin, is then saturated with shell-lac and ironed down around the edge to strengthen it and to keep the parts together. Lastly, the brim is put over the block and fastened in a

similar way, the inner edge being turned up and ironed against the side and finally strengthened with a piece of robbin. After the brim has been trimmed the body is again varnished with a solution of shell-lac and alcohol, and when this is dry the hat is ready for the cover of silk plush. The brim is covered by one piece on the under side, which is put on first, and one on the upper. These are secured by ironing with a hot iron, which softens the varnish and causes it to stick the plush to the body. The cover for the side, to which the circular piece for the top has been sewed with a scarcely discernible seam, is next slipped on and ironed until it adheres thoroughly, the seams being carefully concealed. Fashionable hats require the finest quality of French plush; that made by Martin at Lyons and Metz is held in the highest estimation on account of the excellence of the black dye with which it is colored. The hat is now lined and trimmed, and afterward shaped and smoothed with the iron. Great care is given to finishing the brim, which is curled by hand, the workman judging by his eye of the perfection of the outline. The lining of the best quality of hats is of silk, that of the cheaper kinds usually of paper. In what are called French gossamer bodies, the body is composed of but one thickness of muslin, and the silk lining is ironed on to this so as to stick fast to it, after which another thickness of muslin is ironed on to the outside. In those called English bodies, the body is generally of two thicknesses, and has another thickness of muslin ironed on to it after the hat is formed. This is the common style of hat, and weighs about four ounces. Hat bodies are sometimes made also of cork, willow, and felt. Cork bodies are cut very thin, and are of course very light. Willow bodies are of thin slips of willow, woven by a process patented by a firm in Philadelphia. White hats for summer wear, called cassimere hats, are made of felt. The superiority of American silk hats is owing to the scrupulous care in the selection as well as in the manipulation of the materials. The best are not surpassed in Europe. The French make hats of similar quality; but in England the humidity of the climate will not admit the use of hats so light as those worn in America.—According to the census of 1870, the total value of the hat and cap manufactures of the United States in that year was \$24,848,167; of which New York produced \$8,708,723, New Jersey \$5,007,270, Connecticut \$3,740,871, Massachusetts \$3,416,191, and Pennsylvania \$2,813,766.—For straw hats, see STRAW.

HATRAS, a town and fort of India, in the province and 90 m. S. E. of the city of Delhi; pop. about 25,000. It is the chief mart for the cotton produced in the neighborhood, which is forwarded to Furruckabad, on the Ganges, and conveyed by that river to the lower provinces. The present fort is a square of about 500 yards, and is surrounded by a mud wall and a deep

dry ditch. The old fort is situated half a mile E. of the town, and though now a heap of ruins was once regarded as formidable. Hatras was taken by the British in 1803. At the outbreak of the Mahratta war in 1817 the chief of the place assumed a hostile attitude. He was summoned to surrender the fort, but refused, whereupon the town was breached and evacuated, Feb. 23, 1817. On March 1 fire was opened upon the fort, which was abandoned during the night, and immediately dismantled, as well as the neighboring fortress of Mursan.

HATTERAS. See CAPE HATTERAS.

HATTI-SHERIF (Turkish, noble writing), any ordinance written by the sultan's hand, or which contains his *paraf*, or flourish, and the words, "Let this my order be obeyed." Sometimes it is called *hatti-humayun*, "august writing." A hatti-sherif is irrevocable. The most celebrated in modern times was the hatti-sherif of Gulhane, promulgated by the sultan Abdul-Medjid, Nov. 3, 1839, guaranteeing life and property to all subjects of the empire without distinction of creeds. This ordinance was confirmed by the hatti-humayun of Feb. 18, 1856, which granted religious liberty to the non-Mohammedan population, abolished the civil and judicial authority of the Mussulman ecclesiastics, proclaimed the equality of all creeds and nationalities, abolished persecution and the punishment of religious converts, made non-Mohammedans admissible to public office and ordained their representation in the council of state, permitted foreigners to hold landed property, decreed the establishment of public schools, the codification of the laws, the reform of the monetary system and of the police, and proposed to introduce other public improvements.

HAUCH, Johannes Carsten von, a Danish poet, born in Frederikshald, Norway, May 12, 1791, died in Rome, March 4, 1872. He graduated at the university of Christiania in 1821, travelled in France and Italy, composed several of his dramas while in the latter country, and returned to Denmark in 1827. For several years he was professor of natural sciences in the university of Sorö, and in 1846 he became professor of northern literature at Kiel. Expelled from that office at the insurrection of 1848, Queen Maria Sophia Frederica offered him an asylum at the castle of Frederiksborg, where he resided several years. In 1851 he succeeded Oehlenschläger as professor of æsthetics and belles-lettres at the university of Copenhagen. His works comprise many tragedies, as *Bajazet*, *Tiberius*, *Don Juan*, &c.; a dramatic epic, *Hamadryaden*; lyrical poems and romantic tales, among which are *Wilhelm Zabern* (2d ed., 1848) and *Robert Fulton* (2 vols., 1853). He also wrote upon zoölogy and other natural sciences. His *Nordische Mythenlehre*, in German, appeared in Leipsic in 1848. In concert with Forchhammer he prepared the "Life of Oersted" (Copenhagen, 1853). His latest works were: *Charles de la Bessière* (1860), *Waldeman Seier* (1862), *Nye*

Digtninger (1869), *Afhandlinger og æsthetiske Betragtninger* (1869), and *Minder fra min første Udenlandsreise* (Copenhagen, 1871).

HAUG, Martin, a German orientalist, born at Ostdorf, Württemberg, Jan. 30, 1827. By private study he made himself master of Greek, Latin, and Hebrew. In 1848 he went to the university of Tübingen, where he studied Sanskrit; and he afterward studied at Göttingen and Bonn. In 1856 he was invited to Heidelberg by Bunsen, to aid him in preparing his *Bibelwerk*. In 1859 he went to India, and became professor of Sanskrit in the college at Poona, where he was brought into intercourse with the most learned native priests, and acquired a minute knowledge of their various forms of doctrine and worship. In 1863, under appointment from the British government, he made a journey through the province of Guzerat, and collected many valuable manuscripts in Zend and Sanskrit. He returned to Europe in 1866. His principal works are: *Ueber die Pehlewisprache und den Bundeshesch* (Göttingen, 1854); *Ueber die Schrift und Sprache der zweiten Keilschriftgattung* (1855); *Die fünf Gathas*, &c. (2 vols., Leipsic, 1858-'60); "Essays on the Sacred Language of the Parsees" (Bombay, 1862); and an edition, with a translation, of "The Aitareya Brahmana of the Rigveda" (2 vols., Bombay, 1863).

HAUGHTON, William, an English dramatist, born in the latter half of the 16th century, died probably in the early part of the 17th. He is supposed to have written a number of dramas in connection with Decker and others, and a few unassisted. The only plays attributed with certainty to him are the comedy, "Englishmen for my Money, or a Woman will have her Will," which is reprinted in "The Old English Drama" (4 vols. 12mo, 1830), and "The Pleasant Comedie of Patient Grissill," in which he was assisted by Chettle and Decker, and which was reprinted by the Shakespeare society in 1841.

HAUKSBEE, or Hawksbee, Francis, an English natural philosopher, born in the latter part of the 17th century, died after 1731. He held the office of curator of experiments to the royal society, and was the first to mark the circumstances of electrical attraction and repulsion, and to observe the production of light by friction both in air and in a vacuum. His observations were given chiefly in "Physico-Mechanical Experiments on various Subjects" (4to, 1709; translated into French and enlarged, Paris, 1754).

HAUPT, Moritz, a German philologist, born in Zittau, July 27, 1808, died in Berlin, Feb. 5, 1874. He was a son of ERNST FRIEDRICH HAUPT (1774-1834), who was noted for his Latin metrical versions of Goethe's poems and of German church hymns. Moritz graduated at Leipsic in 1837, and was professor of German language and literature and of classical philosophy from 1838 to 1850, when he was removed on account of his sympathy with the

liberal movement of 1848-'9. He next succeeded his former teacher Hermann as secretary of the historico-philosophical class till 1853, when he became Lachmann's successor in the chair of classical literature at the university of Berlin, where he delivered remarkable lectures until the day before his sudden death. For the last 13 years of his life he was perpetual secretary of the academy of sciences. His works include many critical editions of classics, and he was one of the highest authorities on old German philology.

HAUPTMANN, Moritz, a German composer, born in Dresden, Oct. 13, 1792, died in Leipsic, Jan. 3, 1868. The son of an architect, he was intended for the same profession and became proficient in mathematics and other sciences; but he afterward devoted himself to music. Completing his education under Spohr, he became in 1812 a violinist in the royal orchestra of Dresden, and in 1822 at Cassel under the direction of Spohr. He remained here till 1842, when he became cantor to the Thomas school at Leipsic, and at the same time director of music in the churches of St. Thomas and St. Nicholas, and professor of counterpoint and fugue at the newly established conservatory. His *Die Natur der Harmonik und Metrik* (Leipsic, 1853; 2d ed., 1873) procured him in 1857 from the university of Göttingen an honorary diploma as doctor of philosophy. His sacred compositions are esteemed his best; but his Italian sonnets composed for the contralto voice of his wife, and his duets for violin and piano, were greatly admired. His productions include *Salve Regina* for four voices, a full mass for chorus and orchestra, and the operas *Mathilde* and *Klein Karin*.

HAUREAU, Jean Barthélemy, a French author, born in Paris, Nov. 9, 1812. He received a college education, and became a journalist at Le Mans. After the revolution of 1848 he was appointed keeper of manuscripts at the national library in Paris, and was returned to the constituent assembly for the department of Sarthe, but retired from politics after the *coup d'état* of 1851. In 1861 he was appointed librarian for the order of advocates of Paris, and became a member of the academy of inscriptions and belles-lettres, over which he presided in 1873. His principal works are: *Critique des hypothèses métaphysique de Manès, de Pélage et de l'idéalisme transcendantale de Saint Augustin* (Le Mans, 1840); *Histoire littéraire du Maine* (6 vols., Paris, 1842-'73); *Histoire de la Pologne depuis son origine jusqu'en 1846*; *De la philosophie scolastique* (2 vols., 1851); *François I. et sa cour* (1853); *Charlemagne et sa cour* (1854); *Gallia Christiana*, &c. (3 vols., 1856-'65). The last work is a continuation of the 13 volumes issued by the Benedictines between 1715 and 1785.

HAUSER, Kaspar, a German youth, remarkable for his mysterious history, born about 1812, died at Anspach, Dec. 17, 1833. He was found in the streets of Nuremberg, May 26, 1828,

dressed in the garb of a peasant, and by his apparent helplessness attracted the attention of one of the citizens. On his person was found a letter from which it appeared that since he was six months old his mother had left him in charge of a poor laborer, the writer of the letter, who kept him in close confinement, but brought him up in the Christian religion and taught him to write. The time having arrived for relinquishing the custody of the boy, the laborer removed him from his house during the night and escorted him as far as the vicinity of Nuremberg, leaving him to reach that town alone. Enclosed in the letter was a note purporting to come from Kaspar's mother, and stating that she was a poor girl when she gave birth to him (April 30, 1812), and that his father was a cavalry officer at Nuremberg. The only information which the person to whom the letter was addressed could elicit from the boy was that he came from Ratisbon, and wanted to become a cavalry officer as his father had been. He was removed to the station house, but was unable or unwilling to give any account of himself except that his name was Kaspar Hauser. He would not take anything but bread and water. He could write his name and a few other words, but was otherwise entirely ignorant. Besides the letter, there were found in his possession a pocket handkerchief with his initials marked in red and several Roman Catholic prayer books. He was of a delicate constitution, but well formed, and his general appearance was that of a high-born youth. He was detained in prison as a vagrant, but the mayor of Nuremberg frequently took him to his house, and gradually learned from him that from his earliest childhood he had been kept in a kind of cellar, from which the light was shut out. No human being ever came to see him, excepting a man during the night, who washed and dressed him and brought him bread and water. His only amusement was two wooden horses. Shortly before he was taken away, this man, whose face he was never permitted to see, came more frequently to teach him to write and to walk, and eventually he carried him on his back to Nuremberg. After about two months he was handed over to Professor Daumer, who undertook his education. But the natural ability of which he had given evidence in his conversation decreased as he was subjected to a regular system of instruction. He mastered, however, writing and drawing. He was fond of riding on horseback, and rode well. One of his many peculiarities was that he could not bear the presence of priests and physicians, and that he was restless and uneasy in church. He entered Daumer's family July 18, 1828. On Oct. 17 the professor's mother found him lying prostrate in the cellar with a wound on his forehead. He said that a man whose face was blackened had assaulted him with a knife, upon which he ran away and hid himself in the cellar. The most search-

ing investigations were unavailing to detect the man. By order of the authorities the boy was now removed to the residence of a magistrate and attended by two policemen, but had only been there a few months when one day they heard the report of a firearm, and on entering the room whence it came they found Kaspar weltering in his blood. His explanation was that the wound had been inflicted by the accidental discharge of a pistol. Among the many strangers who became interested in Hauser's fate was Lord Stanhope, who went to Nuremberg in 1831. He removed him to Anspach with a view of completing his education, and placed him in a law office there, where he displayed little ability. He also provided Feuerbach, the jurist, and president of the court of appeal, with the means of pushing legal proceedings. After the death of Feuerbach, who had gained more insight into the case than any other person, and had published *Kaspar Hauser, Beispiel eines Verbrechens am Seelenleben* (Anspach, 1832), Stanhope was about taking his protégé to England, when Kaspar was stabbed in the side, Dec. 14, 1833. He was able to reach his home, and to tell that his murderer was a stranger, who professed to be the bearer of some important revelations, and whom he met by appointment in the palace garden when the wound was inflicted, from which he died three days afterward. Persons then were not wanting who regarded Kaspar Hauser as an impostor, and Merker published a work entitled *Kaspar Hauser nicht unwahrscheinlich ein Betrüger* (Berlin, 1830); but Daumer defended him upon psychological and moral grounds. Strenuous efforts were vainly made to discover the murderer. In 1859 Daumer published at Frankfurt *Enthüllungen über Kaspar Hauser*; and several other works on the subject appeared at about the same time. In 1872 the interest in Hauser was revived by the publication of official documents (*Authentische Mittheilungen über Kaspar Hauser*), by means of which Julius Meyer, a Bavarian jurist, endeavored to prove that he was an impostor. Prof. Daumer published in reply an exhaustive work, *Kaspar Hauser, sein Wesen, seine Unschuld, seine Erduldungen und sein Ursprung* (Ratisbon, 1873), which makes it highly probable that he was the son of the grand duke Charles of Baden and his wife Stephanie, and that the countess of Hochberg and Major Hennehofer were the authors of the crime, which was designed to secure the succession in Baden to the children of the countess and the grand duke Charles Frederick.

HÄUSSER, Ludwig, a German historian, born at Cleeburg, Alsace, Oct. 26, 1818, died in Heidelberg, March 17, 1867. He went in 1835 to Heidelberg to study philology; but through the influence of Schlosser he made also extensive historical researches, and in 1839 published *Die deutschen Geschichtschreiber vom Anfange des Frankenreichs bis auf die Hohenstaufen*. In 1848 he edited in conjunction with Gervi-

nus, the *Deutsche Zeitung*, and was chosen a member of the chamber of Baden. In 1850 he accepted a professorship in Heidelberg, but continued to take an active share in politics, and in 1860 returned to the chamber, where he was a warm supporter of the liberal ministry. Among his most important historical works are *Deutsche Geschichte vom Tode Friedrichs des Grossen bis zur Gründung des Deutschen Bundes* (4 vols., Berlin, 1854-'7), *Geschichte der Französischen Revolution* (1867), and *Geschichte des Zeitalters der Reformation* (1868; English translation by Mrs. R. Sterge, 1874). A complete edition of his works was commenced in Berlin in 1869.

HAUSSMANN, Georges Eugène, baron, a French politician, born in Paris, March 27, 1809. He is a grandson of the revolutionist Nicolas Haussmann of Colmar (1761-1846). He studied law, became an advocate at Paris, and was successively sub-prefect of Nérac (1833), St. Giron (1840), and Blaye (1842), and prefect of the departments of Var, Yonne, and Gironde (1850-'52). In 1853 Napoleon III. appointed him prefect of the department of the Seine, in which office he became celebrated by his extensive operations for the improvement and embellishment of Paris, one of the many new boulevards constructed under his administration bearing his name. The demolition of some old quarters of the metropolis drove many of the indigent working classes to the suburbs, where they subsequently became the most turbulent promoters of the commune; while thousands, on the other hand, were saved from starvation by being employed on Haussmann's public works. The transformation of the Bois de Boulogne into an English park, the prefecture, the new and massive barracks, admirable water works, the restoration of the Hôtel-Dieu, the completion of the Louvre, and many other memorable works were due to Haussmann's enterprise; but they involved an enormous expenditure, requiring repeated loans, and giving rise to much opposition in the press and in the corps législatif, and to charges of mismanagement, which were exposed in 1868 with great success in Jules Ferry's *Comptes fantastiques d'Haussmann*. The prefect succeeded nevertheless in contracting a new loan in 1869 for 260,000,000 francs; but he was obliged to retire after the accession of the Ollivier administration (January, 1870).—See *Histoire générale de Paris*, published under Haussmann's auspices (2 vols., 1866), and *Parallèle entre le marquis de Pombal et le baron Haussmann*, by Lon (1869).

HAUTBOY (Fr. *haut bois*, high wood), or *Oboe*, a musical wind instrument of the reed species, slender at the upper end, but spreading out conically at the lower. Its compass extends from C below the treble clef to G, the fourth line above the staff. It was formerly used chiefly in military music, but is now an indispensable appendage to the orchestra. It derives its name from its high, piercing sound.

HAUTE-GARONNE (Upper Garonne), a S. department of France, formed from the ancient provinces of Languedoc and Gascony, bordering on Spain and the departments of Tarn-et-Garonne, Tarn, Aude, Ariège, Hautes-Pyrénées, and Gers; area, 2,429 sq. m.; pop. in 1872, 479,362. The N. portion is nearly level, but the S. is covered with lofty mountains, mostly spurs from the Pyrenees, one of which, Mont Maladetta, rises to the height of 11,162 ft. The principal rivers are the Garonne, Neste, Salat, Ariège, Save, and Tarn. The climate of the lowlands is in general mild, but that of the mountainous districts is severe in winter. The soil of the valleys and plains is very fertile. The chief vegetable productions are wheat, maize, millet, rye, flax, hemp, potatoes, garlic, fruit, and timber, with which the declivities of the mountains are thickly covered. A large quantity of wine is made, generally of inferior quality. The department is rich in minerals; iron, copper, lead, antimony, bismuth, zinc, coal, rock crystals, slate, gypsum, marble, and granite are found in abundance. The staple manufactures are coarse woollens, canvas, calico, leather, tinware, earthenware, copperware, scythes, files, mathematical instruments, glass, gunpowder, cannon, tobacco, wine, and brandy. It is divided into the arrondissements of Toulouse, Muret, Villefranche, and St. Gaudens. Capital, Toulouse.

HAUTE-LOIRE (Upper Loire), a S. E. department of France, in Languedoc, bordering on the departments of Puy-de-Dôme, Loire, Ardèche, Lozère, and Cantal; area, 1,916 sq. m.; pop. in 1872, 303,732. The surface is volcanic, and in general mountainous, being almost everywhere traversed by offshoots of the Cantal or Cévennes chains, the summits of which are covered with snow during a considerable portion of the year, and their declivities with dense forests, extensive pastures, or chestnut woods and vineyards. The loftiest of its peaks is Mont Mezin, 5,790 ft. high. The principal rivers are the Loire, Allier, and Lignon. The climate varies with the aspect and elevation of every district. The soil of the valleys and plains is fertile. The chief productions are wheat, rye, oats, barley, peas, beans, potatoes, fruit, timber, and wine of poor quality. The minerals are iron, copper, coal, lead, antimony, chalcidony, sapphires, amethysts, marble, gypsum, &c. The only important manufactures are silk, thread lace, and ribbons. It is divided into the arrondissements of Le Puy, Brioude, and Yssingeaux. Capital, Le Puy.

HAUTE-MARNE (Upper Marne), a N. E. department of France, formed chiefly from the ancient province of Champagne, bordering on the departments of Marne, Meuse, Vosges, Haute-Saône, Côte d'Or, and Aube; area, 2,401 sq. m.; pop. in 1872, 251,196. The surface is generally hilly, and occasionally mountainous. Some of the Langres summits attain an elevation of 2,500 ft. The principal rivers are the Marne, Meuse, and Aube. The climate is mild

and healthful in summer, but in winter often very severe in the highlands. The valleys and plains are fertile. The chief productions are wheat, oats, barley, peas, beans, potatoes, mustard, hemp, fruit, garden plants, and timber, with which more than one third of the department is covered. A large amount of wine is made. There are more than 100 furnaces for the smelting and manufacture of iron, and cotton and woollen yarn, woollen stockings, leather, gloves, paper, beer, and brandy are manufactured. It is divided into the arrondissements of Chaumont, Langres, and Vassy. Capital, Chaumont-en-Bassigny.

HAUTES-ALPES (Upper Alps), a S. E. department of France, in Dauphiny, bordering on Italy and the departments of Savoie, Isère, Drôme, and Basses-Alpes; area, 2,158 sq. m.; pop. in 1872, 118,898. The loftiest mountains of France (not including Mont Blanc) lie within its limits, Mont Olan, the Pic d'Ar sine, and Mont Pelvoux rising upward of 13,400 ft. above the sea. The entire surface is rugged and uneven, with vast forests. There is rich pasturage, and the department produces the cereals, wine, hemp, chestnuts, wool, &c. It is divided into the arrondissements of Gap, Embrun, and Briançon. Capital, Gap.

HAUTE-SAÔNE (Upper Saône), an E. department of France, in Franche-Comté, bordering on the territory of Belfort and the departments of Vosges, Doubs, Jura, Côte d'Or, and Haute-Marne; area, 2,062 sq. m.; pop. in 1872, 303,088. The surface is in general mountainous, offshoots from the Vosges and Faucilles ranges covering it to a considerable extent. The highest summits are the Ballon de Servance and the Ballon de Lure, which attain an elevation of nearly 4,000 ft. Its rivers are the Saône and its tributaries, the Coney, Lanterne, Oignon, and Amance. The climate is more equable than that of the surrounding departments, and the soil is on the whole fertile. The principal productions are wheat, rye, maslin (wheat and rye mixed), maize, barley, oats, potatoes, millet, beets, peas, beans, rape, fruit, and timber. The rivers abound with a variety of fish, including trout, carp, pike, barbel, eels, and crawfish. The minerals are iron, coal, porphyry, granite, and gypsum. The staple manufactures are hardware, glass, earthenware, leather, cotton stuffs, paper, brandy, and oil. It is divided into the arrondissements of Vesoul, Gray, and Lure. Capital, Vesoul.

HAUTE-SAVOIE (Upper Savoy), an E. department of France, bordering on the lake of Geneva, Switzerland, and the departments of Savoie and Ain; area, 1,667 sq. m.; pop. in 1872, 273,027. With the department of Savoie and a part of Alpes-Maritimes it forms the territory ceded to France by Sardinia in 1860. The country is mountainous, and Mont Blanc is on the S. E. border. The area of arable land is limited, but the grain raised, with chestnuts, which are an important article of food for the laboring classes, is nearly suf-

ficient for home consumption. In the northern part the vine is cultivated; but a large proportion of the surface is devoted to pasturage, and the mountains furnish timber in abundance. The minerals include iron, copper, and lead, but they are not extensively worked. The manufactures, principally of hardware, coarse woollens, and leather, are not important; and the chief trade is in wool, cattle, and dairy products. It is divided into the arrondissements of Annecy, Bonneville, St. Julien, and Thonon. Capital, Annecy.

HAUTES-PYRÉNÉES (Upper Pyrenees), a S. W. department of France, in Gascony, bordering on Spain and the departments of Gers, Haute-Garonne, and Basses-Pyrénées, and deriving its name from the mountains which bound it on the south; area, 1,749 sq. m.; pop. in 1872, 235,156. Its surface is broken by numerous offsets of the Pyrenees, between which lie picturesque and fertile valleys, watered by the Arros, the Gavede-Pau, and other streams. The department has mines of copper, iron, argentiferous lead, manganese, antimony, and zinc, and contains fine marble, granite, freestone, kaolin, gypsum, and several mineral springs. It produces abundance of fruits, wine, good pasturage, cattle, sheep, and horses, but not enough grain for domestic consumption. The manufactures are not important, and consist chiefly of the woollen stuffs called *barèges*. It is divided into the arrondissements of Tarbes, Argelès, and Bagnères-de-Bigorre. Capital, Tarbes.

HAUTE-VIENNE (Upper Vienne), a W. department of France, formed of parts of the ancient provinces of Marche and Limousin, bordering on the departments of Indre, Creuse, Corrèze, Dordogne, Charente, and Vienne; area, 2,130 sq. m.; pop. in 1872, 322,447. The surface is diversified with mountains, valleys, and extensive plains. The mountains are connected with those of Auvergne, and form a dividing ridge between the basins of the Loire and the Garonne. Their highest point, the Puy-Vieux, is 3,200 ft. The Vienne, Thorion, and Gartempe are the principal rivers. The soil is not fertile, but good pasturage is abundant, and horses, cattle, sheep, &c., are reared. Iron, copper, lead, antimony, tin, coal, granite, amethysts, emeralds, &c., are found, and an active manufacturing industry is devoted to iron, steel, copper, porcelain, paper, &c. It is divided into the arrondissements of Limoges, Bellac, Rochechouart, and St. Yrieix. Capital, Limoges.

HAUT-RHIN (Upper Rhine), formerly a N. E. department of France, in Alsace, bordering on Switzerland and the grand duchy of Baden; area, 1,586 sq. m.; pop. in 1866, 530,285. By the treaty of May 10, 1871, between France and Germany, most of the department was ceded to Germany and now forms a portion of Alsace-Lorraine. (See *ALSACE*.) The portion retained by France contains 235 sq. m., and in 1872 had a population of 56,781. It is called the territory of Belfort, from its capital.

HAÛY. I. René Just, a French mineralogist, born at St. Just, near Beauvais, Feb. 28, 1743, died in Paris, June 3, 1822. He was born of humble parents, but his love for religious music attracted the attention of a priest, who, after giving him some instruction, procured him a situation in the choir of a church in Paris, whence he went to the college of Navarre and to that of Cardinal Lemoine. In the latter institution, where he became a teacher, he first acquired a love for botany; and accidentally entering the lecture room of Daubenton, he conceived a passion for mineralogy, which shaped his course in life. The accidental dropping of a specimen of calcareous spar revealed to him the geometrical law of crystallization. Communicating his discovery to Daubenton, at the suggestion of Laplace, who saw its great importance, he laid it before the academy in 1781. His discovery met with bitter opposition; but the only answer he made to his detractors was new researches and more careful study. From the date of his memoir on the schorls in 1784 commenced a new era in mineralogy; chemistry confirmed the teachings of crystallography, and an entirely new arrangement of minerals was the consequence. During the revolution Haüy, who had received holy orders, was thrown into prison; but the exertions of Geoffroy Saint-Hilaire obtained his release a few days before the massacre of September, 1792. In 1793 he was appointed one of the committee on weights and measures, and in 1794 keeper of the cabinet of mines. In the latter capacity he prepared his principal work, *Traité de minéralogie* (4 vols. 8vo, Paris, 1801), of which a portion had been published in a single volume in 1797. It is a complete exposition of the idea that the crystalline form should be the principal guide in the determination of mineralogical species, elevating his favorite study at once into the class of exact sciences. In December, 1802, he was appointed professor of mineralogy in the museum of natural history. In answer to an application from government to prepare a treatise on physics for colleges, he published in 1803 his *Traité élémentaire de physique*, which passed through three editions. The little emolument accorded to him under the empire he lost under the restoration, and in the latter part of his life he was cramped by poverty; but he endured it with cheerfulness, and was greatly respected by all who knew him. He died from the effects of a fall, leaving as sole inheritance to his family his magnificent collection of crystals, the fruit of 20 years' labor; it is now preserved, in a room by itself, in the museum of natural history in Paris. Among his works, besides those above referred to, are: *Essai d'une théorie sur la structure des cristaux* (1784); *Exposition de la théorie de l'électricité et du magnétisme* (1787); *De la structure considérée comme caractère distinctif des minéraux* (1793); *Caractères physiques des pierres précieuses* (1817); and *Traité*

de cristallographie (1822). He also contributed numerous papers to many of the scientific journals of the day. He was a member of the French academy, and of the principal scientific and learned associations of Europe and America. **II. Valentin**, a brother of the preceding, celebrated as an instructor of the blind, and as the inventor of apparatus for their education, born at St. Just, Nov. 13, 1745, died in Paris, March 19, 1822. He was called in France the "apostle of the blind," and commenced his labors in their behalf in 1784. For an account of his career, see **BLIND**.

HAVANA (Span. *La Habana*, or *San Cristóbal de la Habana*), a fortified maritime city, capital of the Spanish colony of Cuba, and of a district of the same name, ranking among the foremost seaports and commercial marts of the world. It is situated on the W. side of a beauti-

ful bay of the gulf of Mexico, on the N. W. coast of the island; lat. 23° 8' N., lon. 82° 22' W. The population is represented in the official returns of 1871 as being only 169,184, comprising 108,754 whites, 37,623 free negroes, &c., and 22,807 slaves; but it is really at least 200,000. The Spanish government has always in its official census returns underrated the population of its colonies. The city stands on a sort of peninsula, formed on one side by the bay and on the other by the waters of the gulf; and it is commonly distinguished into two portions, the intramural or old town, between the bay and the site of the ancient walls, and the extramural or new town, beyond the walls. In the former the streets, though for the most part regular and well paved, are extremely narrow, and, being lowest in the middle, favor the accumulation of great pools of



Havana.

water in the rainy season; and the sidewalks are barely wide enough for one pedestrian. The macadamized thoroughfares of the other portion, rather resembling roads than streets, are ample, well ventilated, and fringed on either side with rows of graceful palm trees. Some of them are among the principal promenades or drives of the city. The prevailing style of architecture is identical with that of the south of Spain. The houses are solidly built of stone, with very thick walls, often painted within and without in showy colors, especially blue, green, or yellow, and sometimes a mingling of all three; they are either of one story and roofed with tiles, or of two stories with a flat roof of substantial masonry, at times surmounted by a *mirador* (lookout), affording at once a magnificent view and a cool and agreeable retreat after sunset. The

windows, which are extremely high, are never glazed, but defended on the outside by strong iron bars, and within by wooden shutters secured, like the doors, with massive bars or bolts. The doors, almost always double, are very ponderous, and open either directly into the *sala* or parlor, or into a large gateway (*zaguan*), guarded by a *portero* or janitor, and leading into an open *patio* (courtyard) whence a spacious staircase leads to the apartments above. All the rooms open upon a covered veranda which surrounds the patio. In the dwellings of the rich the floors and stairs are usually of marble, the decorations and furniture luxurious and tasteful, and the patio is generally embellished with a parterre of exotic flowers and an elegant fountain in the centre. Many of the residences in the extramural portion of the city are constructed in a more

modern style, particularly in El Cerro (the Hill), a handsome street 3 m. long, leading to a village of the same name, and chiefly inhabited by the wealthy and fashionable, especially in summer. There is, however, no quarter of the town exclusively occupied by the higher classes, and in any street a miserable hovel may be seen side by side with a stately mansion. Foremost among the public edifices of Havana is the cathedral, erected in 1724, and used as a college by the Jesuits till 1789; but it is less remarkable for the beauty of its architecture than as being the resting place of the ashes of Christopher Columbus, transferred thither from Santo Domingo, Jan. 15, 1796. On one of the walls is a stone slab with the bust of Columbus in relief, and an inscription beneath. There are fifteen other churches, nine of which are attached to certain monastic orders; two, Santa Catalina and San Juan de Dios, date from the 16th century; one, San Agustín, from the beginning of the 17th; and all are noteworthy for the richness and splendor of their decorations. *El Templete*, the Little Temple, is curious as having been erected in 1828 on the spot where mass was first celebrated, in 1519. There are numerous monasteries and nunneries. The governor's palace, on the W. side of the Plaza de Armas, is a yellow two-story edifice, with a handsome colonnade in front; it is occupied by the captain general, his staff, and the offices of the several government departments. The custom house, fronting on the bay, is a spacious building, devoid of architectural interest; but the customs warehouse, formerly the church of San Francisco, consecrated in 1737, has the loftiest tower in the city. Other buildings or public establishments worthy of mention are the admiralty, the exchange, the university, the prison, a vast quadrangular structure erected in 1771, near the mouth of the bay, and the *real casa de beneficencia*, a large building with beautiful grounds and comprising an orphan asylum and an asylum for vagrants, established about 1790. Havana has three theatres, one of which, built under the auspices of Captain General Tacón, whose name it bears, is said to be equal in size to La Scala of Milan; an arena for bull fights, this amusement being still popular in Havana; a gymnasium, a circus, and a number of well arranged and comfortable public baths. The university has faculties of philosophy and letters, sciences, pharmacy, medicine and surgery, and law. There is also a large number of public and private schools, the former dependent upon the superior board of public instruction, the president of which is the captain general, and which is composed of three sections, each under a vice president. There is a hospital for those afflicted with a species of leprosy peculiar to the Antilles and reputed incurable; a lying-in, a charity, and a military hospital, and an insane asylum. The cemeteries, seven in number, under the charge of the church, are situated

in the extramural district. Interments are made, as in Spain, in niches of tombs built in several stories above ground, each closed with an inscribed slab. Few cities in the world have a larger number of *paseos* or public promenades and public parks than Havana. The Plaza de Armas, at a short distance from the quays, and facing which is the governor's palace, as already observed, comprises four gardens, with a statue of Ferdinand VII. in the centre; magnificent palms and other trees border the walks, along which are stone seats with iron rests; and a regimental band plays there every evening. The Alameda de Paula, bordering the bay, has an elegant fountain surmounted by a marble column, with military trophies and national symbols. A favorite evening resort is the Parque de Isabel, tastefully laid out, and having in the centre a statue of Isabella II. The Campo de Marte, used as a drill ground for the military, is a large enclosure resembling a trapezium in shape, the longest side of which is 375 ft.; it has four handsome gates, distinguished respectively by the names Colon, Cortes, Pizarro, and Tacón. The Paseo de Tacón is a magnificent wide drive, with double rows of trees, a promenade for pedestrians, and profusely embellished with columns and statues, some of the latter, especially one of Charles III., ranking among the finest specimens of art in America. Adjoining this promenade is a beautiful gate opening into the botanic garden, in which are specimens of countless tropical plants; and besides these gardens are the magnificent grounds attached to the *quinta* or country residence of the captain general. Other paseos, such as those of La Reina, El Prado, La Cortina de Valdés, and El Salón de O'Donnell, vie in beauty and scenery with those enumerated. In the vicinity of the city are numerous places of fashionable resort, such as Marianao, Puentes Grandes, and Guanabacoa. Not least among the interesting features of Havana were formerly the walls which girded the old town, commenced in 1633, under Flores, but not completed till 1702. With their forts, ten bastions, and seven gates, they were quite useless; and a new town having grown up beyond them, they were almost totally demolished in 1864, and handsome dwellings erected in their place, materially improving the appearance and sanitary condition of the city. Good water is brought from the river Chorrera by an aqueduct about 7 m. long, furnishing a sufficient supply for use and for about 50 public fountains. The city is well lighted with gas. There are eight good hotels, and a great number of restaurants, cafés, &c.—The climate of Havana is essentially tropical; but the excessive heat is tempered by the sea breeze, which blows regularly every morning, and the agreeable *terral* (land breeze) every evening. There are but two seasons: the dry or so-called winter season, from November to May, when very little rain falls; and the wet or summer season, which usually begins early in June and lasts till

about the middle of October, and during which scarcely a day passes without heavy rain, sometimes accompanied by violent thunder and lightning. The mean temperature during the day is 80° F. in winter, and 86° to 90° in summer. Havana has several times been visited by terrific hurricanes, especially in 1768, 1810, 1844, and 1846, when numbers of ships anchored in the bay were entirely destroyed, and much damage was done in the city and surrounding country. Yellow fever prevails each year, commencing generally toward the end of June, and disappearing in September; foreigners only are attacked by this disease, which is particularly fatal among the shipping and soldiers. The average mortality is 27 per day throughout the year.—The harbor, one of the finest in the world, is entered from the northwest by a channel which is narrow for about three eighths of a mile, and then opens into a magnificent triple-headed bay, with a mean depth of five fathoms, and capable of accommodating 1,000 vessels of any size. The wharves, which, save the portion occupied by the paseos above mentioned, extend along the whole water front of the town, are provided with covered sheds, and are almost continually lined with ships of all nations, closely ranged with their bowsprits inward. The harbor is defended by six forts. One of these, the *batería de la Punta*, stands on a projecting tongue of land called the Punta, to the right of the entrance; another, the Morro castle, is placed directly opposite the first; both were built at the close of the 16th century. On the same side as the Morro are the fortifications of La Cabaña, situated upon abrupt hills overlooking the narrow entrance; still further inward is the Casa Blanca, commanding the city; and beyond, in regular succession around the bay, are seen the forts Número Cuatro, Principe, San Lázaro, and Pastora, the tower of Chorre-ra, and the fortress of Santo Domingo. Between the forts Número Cuatro and Casa Blanca stands the little town of Regla, with its vast warehouses of stone and corrugated iron, as handsome and substantial as any in the world, and in which is stored each year the greater portion of the sugar of the island previous to its exportation. In the arsenal, erected in 1734, ship building was formerly carried on; it has a dry dock of sufficient capacity for a vessel of 1,000 tons; and cannon were cast here of bronze, the copper being furnished by the Cobre mines on the island.—There are in Havana some iron founderies, machine shops, and carriage and other factories; but the chief manufacturing industry is that of tobacco. No less than 100 first-class and innumerable minor establishments are devoted to the manufacture of cigars, of ever changing brands, usually numbering about 1,000; and the average daily production of paper cigarettes is computed at 2,600,000.—After New York, Havana is the principal commercial port of the new world. About two thirds of the foreign

commerce of the island is carried on through it, the chief articles of export being sugar, rum, molasses, and tobacco, with oranges, pineapples, plantains or bananas, and fruit jellies. The quantities of sugar exported in the two years 1872-'3 were as follows:

YEARS.	Boxes.	Hhds.	Total in lbs.
1872.....	1,161,178	51,059	108,898,370
1873.....	1,168,357	53,003	119,089,230

The total value of that exported in 1872 was \$26,666,672 50; in 1873, \$26,892,927 50, approximately. In 1872 there were exported some 1,500 tierces (12,000 gallons) of molasses, 20,841 pipes (2,605,125 gallons) of rum, 248,775 lbs. of wax, 18,210,800 lbs. of tobacco in leaf, 229,087,545 cigars, and 19,344,707 packages (containing each 25) of cigarettes. In 1873 the quantity of leaf tobacco exported was 18,184,350 lbs., the number of cigars 239,168,758, and of packages of cigarettes 24,065,084. The imports consist chiefly of linen, cotton, woollen, and silk fabrics, breadstuffs, machinery for sugar mills, railway materials (the last four from the United States), wines, oil, &c. The following table exhibits the number, nationalities, and tonnage of the vessels entered in 1872:

COUNTRIES.	Number.	Tonnage.
United States	882	417,725
Spain	785	223,416
Great Britain	300	106,261
Prussia	44	69,721
France	52	88,588
Norway	57	20,752
Other nations	49	18,091
Total.....	2,169	899,504

There are two lines of steamers, averaging three vessels per week, from New York; weekly lines from Philadelphia, Baltimore, and New Orleans; and a line twice weekly from Key West; weekly lines from Spain, France, and England, some of the steamers of the two last *in transitu* for Vera Cruz and other gulf ports of Mexico; steamers weekly to Matanzas; and an extensive coasting trade with Santiago de Cuba and the intermediate ports. An extra steamer from New York every 20 days for Vera Cruz carries passengers and freight to and from Havana. Four railways, with numerous branches, place the city in communication with the principal towns in the Western Department; telegraphs extend to all important points in the island; there is a submarine cable to Key West, and another from Batabanó to Santiago de Cuba, and thence to Kingston, Jamaica, connecting with that from the latter island to Aspinwall. Horse cars run every five minutes between the old and new towns; besides which there are several lines of omnibuses, and a large number of public vehicles running very cheaply. Havana has three public and a large number of private banks; es-

establishments of commercial, industrial, and agricultural credit; a savings bank; a *monte de piedad* (pawn office) under the direction of the government; and 21 daily and other newspapers and periodicals. Besides the library of the university, there are several others attached to the various literary and scientific institutions. The royal Havana lottery is under the immediate supervision of the government, to which it yields annually about \$40,000,000; and another lottery, under the auspices of the municipal government, was organized in 1873.

—Diego de Velazquez, the conqueror of the island, founded, on July 25, 1515, a town at the mouth of the river Güines or Mayabeque, and called it San Cristóbal in honor of Christopher Columbus. Shortly afterward it was transferred to the embouchure of the Rio Almendares, and finally, in 1519, to its present site and under its present name. As early as 1508 Sebastian de Ocampo visited the bay for the purpose of repairing his ship, and from that circumstance named it *bahía de las Carenas* (Caren bay). To its convenient geographical position and the excellence of its harbor is due the rapid growth and early prosperity of Havana; but that prosperity aroused before long the cupidity of freebooters and pirates, who sacked and burned it in 1538. In order to prevent the repetition of similar incursions, a fort called La Fuerza, still standing and occupied as a barrack, was built by Hernando de Soto, and the town declared to be a stronghold, orders being issued at the same time that it should be saluted by vessels of war entering the port. Havana was probably raised to a bishopric soon after its foundation, for its second bishop died in 1528. In 1539 De Soto set out from here on his expedition for the conquest of Florida, taking with him 900 foot and 300 horse, but leaving the garrison well defended; for Havana had already been constituted the chief naval station and port of outfit for the Spanish forces in the new world, then called Indias, and the indispensable haven and outpost for the newly established viceroyalty of New Spain, whose shores were without any adequate harbors. In 1550 the residence of the captain general and the seat of government were transferred from Santiago de Cuba to Havana. In 1551 pirates, under the notorious Jacob Sores, sacked the church and the houses of the wealthy, and forced the commandant of the fort to surrender. After committing numerous outrages and murdering many of the influential citizens, Sores departed; but the place was afterward repeatedly seized by buccaneers. It was unsuccessfully attacked by Drake in 1585; but from that time until the middle of the 18th century it was the scene of no remarkable event. The yellow fever first made its appearance among the shipping in the summer of 1761. The following year an English squadron commanded by Admiral Pocock bombarded the city, and compelled it to capitulate, Aug. 14, after a brave defence during two months. It was re-

stored to the Spaniards in 1763, by the treaty of Paris. In 1782 was published *La Gaceta de la Habana*, the earliest newspaper in the island. In 1789, after the expulsion of the Jesuits, their church became the cathedral of Havana, in which seven years later was deposited the urn containing the ashes of Columbus. In 1818 the port of Havana, in common with the others of the island, was by law opened to foreign commerce. The work on the first railway of the island, that from Havana to Güines, was begun in 1835; and in 1837 the first ferry boats were established between the city and Regla on the opposite shore of the bay. In 1850 the first line of mail steamships from Cadiz to Havana was established. On the revolution in Hayti in 1795 upward of 12,000 families from that island settled in Havana, as did also a large portion of the French army driven from Hayti in 1802; and a few years later, during the struggle of the Spanish continental colonies for their independence, vast numbers took refuge in Havana, especially from Mexico. Many useful institutions and material improvements and embellishments of the city are mainly due to Captain General Don Miguel Tacón, such as the fire company, established in 1835, the theatre which bears his name, and several of the finest public promenades.

HAVEL, a river of Germany, and the principal right branch of the Elbe. It rises in a small lake near Neu Strelitz in Mecklenburg, flows S., passing within a few miles of Berlin, to Potsdam, and thence W. and N. W. to its junction with the Elbe. Its entire length is 218 m., and it is navigable to Fürstenberg, 30 m. from its source. It is the connecting link of a chain of 18 lakes, of which the lake of Tegel, the most northerly, the great lake between Spandau and Potsdam, the Fahrlandsee, the Jungferensee near Potsdam, and the Schilowsee are the most important. Near Deetz it expands to a breadth of 1,000 ft., and again contracts suddenly to 300 ft. Near Brandenburg it enlarges into the Beetzsee. Its principal affluents are the Rhin, Dosse, Spree, and Plau. The Finow canal connects it with the Oder, and the Plau canal with the Elbe; and the Rappin canal, connecting the upper and lower course by means of the Rhin, saves a long stretch of winding navigation. The river, with these canals, is of great importance to the internal commerce of Prussia.

HAVELOCK, Sir Henry, a British soldier, born at Bishop Wearmouth, Durham, April 5, 1795, died near Lucknow, India, Nov. 25, 1857. He was educated at the Charterhouse school. In 1813 he began the study of the law, but in 1815 obtained a commission in the army, and in 1823 was sent to India. He distinguished himself in the Burmese war of 1824, and at its conclusion was sent on a mission to the court of Ava, and in 1827 published "The History of the Ava Campaigns." In 1828 he was promoted to a captaincy, and accompanied

the army for the invasion of Afghanistan as staff officer of Sir Willoughby Cotton. He was at the storming of Ghuznee and the occupation of Cabool, and wrote a "Narrative of the War in Afghanistan in 1838-'9" (2 vols. 8vo, London, 1840). He afterward distinguished himself in Afghanistan, in the Mahratta campaign, and in that against the Sikhs. In 1843 he was appointed Persian interpreter to the commander-in-chief, and brevetted as lieutenant colonel, and at the conclusion of the Sutlej campaign was appointed deputy adjutant general at Bombay. In 1849 he went to Europe for his health, and returned to Bombay in 1851, and became in succession brevet colonel, quartermaster general, and adjutant general. In the expedition sent to Persia in 1856, he commanded the troops at the taking of Mohammerah. He returned to Bombay when peace was concluded, and sailed for Calcutta, but was wrecked on the voyage (April, 1857) off the coast of Ceylon. Reaching Calcutta while the sepoj mutiny was at its height, he was at once despatched to Allahabad to take command of a column destined for the relief of Cawnpore, which was then besieged by the Nana Sahib. He left Allahabad in the beginning of July with about 1,200 men, and, having been joined by a reinforcement which raised his strength to nearly 2,000, encountered and routed 3,500 mutineers at Futtehpore, and on the 16th defeated the Nana before Cawnpore. The Nana having fled on the following day, Havelock entered the city, to find that the surviving Europeans had been massacred on the 15th. From Cawnpore Havelock followed the Nana to Bithoor, defeated him, and burned the place. He then pushed on toward Lucknow, where the garrison, under Inglis, was closely beset. Having crossed the Ganges on the 25th, he was opposed at Onao by the enemy, over whom he gained a brilliant victory (July 29). On the same day he defeated the mutineers again at Busserut-Gunge; but a few days afterward, finding his force reduced to about 1,300 men, and being encumbered with the sick and wounded, he had to retreat and wait for reinforcements. The enemy immediately reoccupied Busserut-Gunge, and Havelock returned twice and drove them out. After the third attack (Aug. 12) he recrossed the Ganges to Cawnpore, having now only 1,000 men. Joining Gen. Neill at that place, he marched against the Nana, who had reentered Bithoor, and routed him, Aug. 16. On Sept. 15 Gen. Outram reached Cawnpore with 1,700 men. His rank was higher than Havelock's, but he relinquished to the latter the chief command; and on the 19th Havelock, now major general, again set out for Lucknow, Outram accompanying the force as a volunteer. After a series of battles he reached that city on the 25th, and fought his way with a loss of over 500 men into the residency, where Inglis was shut up. Outram now took the command. Under him, seconded by Have-

lock, the garrison and their relievers had to withstand a siege until the arrival of Sir Colin Campbell enabled them to retire to Cawnpore. The residency was evacuated Nov. 22, but Havelock, whose strength had been broken by sickness and exposure, died of dysentery three days afterward. Previous to his death the commander-in-chief had conferred on Havelock the "good service pension" of £100 a year. A baronetcy having been conferred on him the day after his death, the title, together with an annuity of £1,000, was given to his eldest son, Henry Marshman Havelock (born Aug. 6, 1830), who had been with his father in Persia, and during the campaign against the sepoys, in which he was twice wounded. An annuity of £1,000 was also granted to his widow, who was a daughter of the missionary Dr. Marshman.—See J. C. Marshman's "Memoirs of Havelock" (2d ed., London, 1870).

HAVEN, Alice Bradley, an American authoress, born in Hudson, N. Y., Sept. 13, 1828, died at Mamaroneck, N. Y., Aug. 23, 1863. Her maiden name was Emily Bradley, and while a school girl she sent, under the pseudonyme of Alice G. Lee, many attractive sketches to the Philadelphia "Saturday Gazette," edited by Joseph C. Neal. Their correspondence resulted in her marriage with Mr. Neal in 1846, and at his request she assumed the name of Alice, and thereafter wrote under the pseudonyme of Cousin Alice. On his death in 1848 she took the editorial charge of the "Gazette," and conducted it for several years, contributing at the same time poems, sketches, and tales to other periodicals. She published a volume in 1850 entitled "The Gossips of Rivertown, with Sketches in Prose and Verse," but is more generally known by her series of juvenile stories, as "Helen Morton," "Pictures from the Bible," "No such Word as Fail," "Patient Waiting no Loss," "Contentment Better than Wealth," "All's not Gold that Glitters," "Out of Debt out of Danger," "The Coopers," and many others. In 1853 she was married to Mr. Samuel L. Haven. Her biography has been published under the title "Cousin Alice, a Memoir of Alice B. Haven" (New York, 1865).

HAVEN, Erastus Otis, an American clergyman, born in Boston, Mass., Nov. 1, 1820. He graduated at Wesleyan university, Middletown, Conn., in 1842. After teaching some years in Amenia seminary, New York, he entered the itinerant ministry of the Methodist Episcopal church, and was pastor about six years in New York and vicinity. In 1853 he accepted the professorship of Greek and Latin in the university of Michigan, but left it in 1856 to become editor of "Zion's Herald" in Boston, where he resided till 1863. During this time he was a member of the Massachusetts board of education, and served two terms in the state senate, being specially prominent in the advocacy of educational interests. In 1863 he became president of the university of Michigan, which during the next six years nearly doubled

in numbers and in resources, and became one of the largest universities of the country. In 1869 he became president of the Northwestern university at Evanston, Ill.; in 1872 he was elected first corresponding secretary of the Methodist Episcopal board of education; and in June, 1874, he was appointed chancellor of the Syracuse university, N. Y. He is the author of "The Young Man Advised" (12mo, New York, 1855), "Pillars of Truth" (1860), and "Rhetoric, a Text Book for Schools" (1869).

HAVEN, Gilbert, an American clergyman, born near Boston, Sept. 19, 1821. He graduated at Wesleyan university in 1846, and for two years taught Greek and Latin in Amenia seminary, of which in 1848 he became principal. In 1851 he joined the New England conference of the Methodist Episcopal church, and was stationed successively at Northampton, Wilbraham, Westfield, Roxbury, and Cambridge, Mass. In 1861 he was appointed chaplain of the 8th Massachusetts regiment, the first commissioned chaplaincy after the breaking out of the civil war. In 1862 he made a tour in Europe and the East, and on his return was stationed as pastor for two years in Boston. His earnest advocacy of the cause of the colored population, both before and during the civil war, led to his appointment in 1865 to the supervision of the interests of the destitute freedmen and whites in the state of Mississippi. In 1867 he was appointed editor of "Zion's Herald," Boston, and continued in this office till 1872, when he was elected bishop of the Methodist Episcopal church. The general conference assigned his residence at Atlanta, Ga., and placed under his special superintendence the interests of the Methodist Episcopal church in the extreme southern states. He has been a persistent advocate of Protestant missions in Italy and among the Spanish-speaking peoples, and in 1872 and 1873 visited Mexico in the interest of this cause. He has published "The Pilgrim's Wallet," a book of travels (1864), and "National Sermons: Sermons, Speeches, and Letters on Slavery and its War" (1869).

HAVEN, Joseph, an American clergyman, born in Dennis, Mass., in 1816, died in Chicago, May 23, 1874. He graduated at Amherst college in 1835, studied in the Union theological seminary in New York, and graduated at the theological seminary at Andover in 1839. He was pastor of Congregational churches in Ashland and Brookline, Mass., in 1850 became professor of mental and moral philosophy in Amherst college, and in 1858 of systematic theology in the Chicago theological seminary. In 1870 he resigned his professorship on account of enfeebled health, and visited Germany, Palestine, and Egypt. In 1874 he was appointed professor of mental and moral philosophy in the university of Chicago. Dr. Haven has published "Mental Philosophy" (Boston, 1857), "Moral Philosophy" (1859), both extensively used as school text books, and "Studies in Philosophy and Theology" (Andover, 1869).

HAVERFORD COLLEGE, an institution of learning under the care of the society of Friends, founded by members of that body in Philadelphia, New York, and New England, and opened in the autumn of 1833. It is situated in the township of Haverford, Delaware co., Pa., on the line of the Pennsylvania railroad, 8 m. N. W. of Philadelphia. The buildings stand on a lawn of 60 acres, laid out with great taste, and adorned with a fine collection of trees and shrubbery. The institution is richly endowed, and furnished with libraries, a chemical laboratory, philosophical apparatus, mineralogical and geological cabinets, and an astronomical observatory. In 1873-4 there were 5 professors, 50 students, and 8,932 volumes in the libraries. The total number of graduates was 232.

HAVERFORDWEST (Welsh, *Hwlford*), a parliamentary borough, town, and county in itself, of S. Wales, locally in Pembrokeshire, of which it is the capital, on the Cleddy, about 200 m. W. by N. of London; pop. in 1871, 11,390. The parish church of St. Thomas dates from 1225. Among the schools is one founded in 1684 for clothing and educating 24 boys and 12 girls. The river is navigable to this point at spring tides for vessels of 100 tons, but the port is dependent on that of Milford. It was once strongly fortified, but all traces of the walls and towers have disappeared. On a rock overhanging the river was a strong castle built in the 12th century by Gilbert de Clare, first earl of Pembroke. In the insurrection of Owen Glendower it was successfully defended against the French troops in the Welsh service. In the civil wars of the 17th century it was held by the royalists. The only remaining vestige of the castle is the keep, which has received large additions and been converted into the county jail.

HAVERHILL, a city of Essex co., Massachusetts, on the N. bank of the Merrimack river, at the head of navigation, 18 m. from the sea, and 27 m. N. of Boston; pop. in 1850, 5,877; in 1860, 9,995; in 1870, 13,092, of whom 2,003 were foreigners. It is connected by two handsome bridges with Bradford on the opposite bank of the river. The Boston and Maine railroad crosses the Merrimack at this point, and connects at Bradford with the Newburyport railroad. A street railroad company has recently been organized. The city is divided into six wards, and is about 12 m. in length on the river and 3 m. in breadth, bordering on New Hampshire. Within its limits are several hills, commanding extensive and beautiful views, and four lakes, from two of which it draws its supply of water. At the E. extremity is Rocks village, connected with West Newbury on the opposite bank of the Merrimack by a wooden bridge, and at the W. extremity Ayers village, containing several manufactories. The thickly settled portion is pleasantly built on a gentle acclivity, presenting with its neat shaded dwellings and background of hills a remarkably attractive appearance. There are a soldiers' monument of white marble, a fine city hall,

an odd fellows' and a masonic building, two other public halls, five hotels, and six wharves. Haverhill is noted for the manufacture of boots and shoes, which is the principal industry, and in which it is surpassed only by Lynn. In 1832 the number of firms engaged in the business was 28; in 1837, 42; in 1860, 100; in 1874, 150. The shipments have been as follows; in 1850, 46,272 cases; 1855, 66,984; 1860, 83,856; 1872, 200,000, worth about \$8,000,000. The number of hands employed is from 6,000 to 8,000, many of whom are Canadian French. The goods manufactured here are principally for women's, misses', and children's wear, and are sold chiefly in the west and south. There are also 26 manufactories of heels, &c., 3 of lasts, 1 of shoe nails and tacks, 8 or 10 of other articles used in the manufacture of boots and shoes, 3 of carriages, 4 of bricks, 3 of wool hats, 5 of paper boxes, 1 of woollens, a bonnet bleachery, 4 machine shops, 4 national banks with an aggregate capital of \$840,000, and 2 savings banks with deposits in 1874 amounting to \$3,128,000. Four or five small streams furnish water power. The valuation of property in 1873 was \$10,861,470; taxation, \$217,229 40; debt, Jan. 1, 1874, \$352,875 64. The number of public schools in 1873 was 47, viz.: 1 high, 25 grammar, and 21 primary, having 52 teachers and 2,111 pupils. There are a daily, a tri-weekly, a semi-weekly, and two weekly newspapers, a public library, a children's aid society and

home, a young men's Christian association, and 20 churches.—Haverhill was settled in 1640, and incorporated in 1645. A city charter was granted in 1870. For a long period it was a frontier town, and suffered severely during the Indian wars. In 1697 Mrs. Hannah Dustin was taken captive during an Indian attack, but shortly after escaped by killing 10 of her captors, with the aid of a boy and her nurse. The city is the birthplace of the poet Whittier.

HAVERSTRAW, a town of Rockland co., New York, on the W. bank of the Hudson river, opposite Peekskill, and 32 m. N. of New York city hall; pop. in 1870, 6,412. The principal village is situated on the margin of the river, and is overhung by a line of limestone cliffs, which produce large quantities of lime. About 2 m. above is the village of Grassy Point. The principal business is the manufacture of bricks. The village contains a bank, a select school, two hotels, a weekly newspaper, print works, a foundry, a ship-building establishment, and three cigar factories. The town also contains the incorporated village of Warren, situated in the S. part. Stony Point, famous in the revolutionary war, is just above Haverstraw, from which it was separated in 1865.

HAVRE (Fr. *Le Havre*), a fortified seaport of Normandy, France, in the department of Seine-Inférieure, situated on the S. shore of the English channel and on the right bank of the Seine, 108 m. direct, or 143 m. by rail, N. W. of Paris, and 44 m. W. of Rouen; lat. 49° 29' 14" N.,



Havre.

lon. 0° 6' 38" E.; pop. in 1872, 86,825. Next to Marseilles it is the principal emporium of France, and has direct communication by steam vessels with London, Rotterdam, Hamburg, Copenhagen, St. Petersburg, Cadiz, Malaga,

New York, &c. With the United States the commerce is of great magnitude, and Havre is an important point of departure of emigrants. It receives the bulk of the American cotton, and ships most of the exports of French goods

to the United States. The number of vessels entered in 1870 was 8,458, tonnage 2,516,898, of which 116, tonnage 114,000, were American; cleared, 5,707, tonnage 1,386,152. The number of vessels belonging to the port is about 500. The imports of cotton in 1870 were 464,985 bales, of which 294,032 bales were from the United States. The imports of petroleum were 116,247 bbls.; of coals, 116,100 tons. The total value of the imports and exports is about \$250,000,000 annually; and about one fifth of the whole foreign commerce of France is carried on through this port. The imports consist chiefly of cotton, spices, coffee, tea, sugar, timber, &c., and the exports of French manufactured goods, wine, brandy, oil, jewelry, salted meat, butter, cheese, fish, &c. There are manufactories of paper, sugar refineries, a government manufactory of tobacco, a large cotton factory, several manufactories of machinery, a large establishment for the manufacture of salt, &c. The ship yards of Havre produce the best vessels in France. Its docks are among the finest in the world and capable of accommodating over 600 vessels. The largest, called l'Eure, has an area of 700,000 sq. ft., and one of its dry docks is 515 ft. long by 112 ft. broad. A basin recently constructed has an area of 53 acres. Havre is much frequented during the season for sea bathing. It has a commercial court, a school of navigation with an observatory, three theatres, a public library, an exchange, a chamber of commerce, a merchants' club house, and a Lloyd's with the principal European journals. Among the churches are an English chapel and an American church. The old fortifications have been removed, and new forts constructed on the heights, which command both the city and the sea. The military quarter of Havre contains an extensive arsenal. The city hall, which is centrally situated, is a magnificent edifice, resembling the late Tuileries in the style of its architecture. The adjoining picturesque village of St. Adresse is studded with pretty villas and gardens.—Havre was founded by Louis XII. at the beginning of the 16th century, and consisted then only of a few huts. Francis I. caused it to be fortified, and the construction of a port was begun under his auspices. It was called after him Ville Française or Franciscopolis, and afterward, from a chapel of that name, Havre de Grâce. The English took it in 1562, and bombarded it on several occasions in the 17th and 18th centuries. The extension of the fortifications and of the town generally was ordained by Louis XVI. in 1786, and has since been carried out far beyond the original plans. Among the eminent persons born in Havre are Mlle. Scudéry, Mme. de Lafayette, Bernardin de St. Pierre, and Casimir Delavigne.

HAVRE DE GRACE, a town of Harford co., Maryland, on the W. bank of the Susquehanna river, near its mouth in Chesapeake bay, 35 m. N. E. of Baltimore; pop. in 1870, 2,281, of whom 441 were colored. It is the S. terminus

of the Tidewater canal, and the Philadelphia, Wilmington, and Baltimore railroad here crosses the river on a bridge 3,271 ft. long, completed in 1867 at a cost of more than \$1,250,000. The town is noted for its scenery, and has considerable trade in coal, and a weekly newspaper. It was laid out in 1776, and was burned by the British in the war of 1812.

HAWAIIAN ISLANDS, or *Sandwich Islands*, the most northerly cluster of the Polynesian archipelago, constituting a kingdom, and consisting of 12 islands, in the North Pacific, between Mexico and China, extending about 360 m. in a curve from N. W. to S. E., between lat. 18° 55' and 22° 20' N., and lon. 154° 55' and 160° 15' W. Their names and areas, in order from S. E., are: Hawaii, 4,040 sq. m.; Maui, 603 sq. m.; Molokini, islet; Kahoolawe, 60 sq. m.; Lanai, 150 sq. m.; Molokai, 169 sq. m.; Oahu, 522 sq. m.; Kauai, 527 sq. m.; Lehua, islet; Niihau, 70 sq. m.; Kaula and Bird island, islets; total, about 6,100 sq. m., of which two thirds are included in the principal island, which gives its name to the group. The islands are of volcanic formation and mountainous, the fertile lands being mostly confined to the valleys and to a belt of alluvial soil at the shore. The uplands are better adapted to grazing than to tillage. The mountains, covered with dense forests, are not cultivable. The windward coasts, which receive the N. E. trade winds, intercept the rain, and are fertile, while the leeward parts of the same island may be almost rainless. On the windward side the mountains are densely wooded. The upper limit of vegetation is determined by the aspect. On the windward side of Mauna Kea the writer has observed mosses at a height of more than 12,000 ft.; on the leeward side of Mauna Loa vegetation ceases at 8,000 ft. Only seven of the islands are inhabited. Hawaii, the easternmost (formerly misnamed Owhyhee), is of a triangular shape, and is of the most recent formation; it consists of a sloping belt of coast land, a high central plateau, and three principal mountains: Mauna Kea, 13,953 ft.; Mauna Loa, an active volcano, 13,760 ft.; and Mauna Hualalai, 7,822 ft. In no part of the islands can one journey far without seeing extinct craters, generally overgrown with luxuriant vegetation. Many hundred square miles of Hawaii are covered with recent and barren lavas. Near the shore the natives cultivate sweet potatoes upon lavas that are hardly cooled, pulverizing the scoria and mixing with it a little vegetable mould. Earthquakes, generally slight, occur frequently upon Hawaii, but not so often upon the other islands. From June, 1833, to May 31, 1867, 173 shocks were recorded at Hilo. On April 2, 1868, five days before a great eruption from Mauna Loa, violent shocks occurred in the district of Kau, and a volcanic wave which followed the earthquake swept away the hamlets on the coast. Hawaii has two great active craters, Kilanea and Mauna Loa; the former is continually, the lat-

ter intermittently active. From the latter great eruptions took place in 1832, 1840, 1843, 1852, 1855, 1859, 1868, and 1873. The lava generally forces its way through the side of the mountain at a distance of several miles from the terminal crater, which is active at the same time. The eruptions of 1840, 1859, and 1868 made their way to the sea, adding somewhat to the area of the island. Those of 1843 and 1855 poured out respectively about 17,000,000,000 and 38,000,000,000 cubic feet of lava. That of 1859 ran 50 m. to the sea in eight days. Kilauea is the largest continually active crater in the world. It is situated upon the eastern part of Mauna Loa, at an elevation of 3,970 ft., and is a pit 8 m. in circumference and 1,000 ft. in depth. Its eruptions are commonly independent of those from the summit crater. The crater is easily descended, and the melted lava may be often dipped out upon the end of the traveller's staff. The principal town upon this island is Hilo, on the N. E. coast, which is rainy, fertile, and highly tropical in appearance. The leeward coasts of Hawaii are sterile and volcanic, overhung in many parts by a steep bleak mountain. Herds of wild cattle, descended from a stock introduced by Vancouver in 1793, roam in the mountain forests, where they are hunted for the sake of their horns and hides. Maui, the second island in size, is composed of two mountainous peninsulas connected by a low isthmus. Mauna Haleakala, on the eastern peninsula, is 10,200 ft. high, and has an extinct summit crater, the largest known, being 2,000 ft. deep and 27 m. in circumference. The principal town is Lahaina. Kauai, the third island in size, is the most uniformly tropical in character; it is fertile and abundantly watered. Oahu, the fourth, has fertile plains upon the N. and S. sides; the latter are the best cultivated, and are the most populous region in the whole group. The capital, Honolulu, is here situated. The highest peak on Oahu is 3,310 ft. high. Molokai, the fifth island in size, is mountainous, presenting a magnificent wall of precipices to the north; it is thinly inhabited, as are the yet smaller and lower islands, Lanai and Niihau. Kahoolawe, Molokini, Lehua, Kaula, and Bird island are uninhabited.—The Hawaiian islands have one excellent harbor, that of Honolulu, on the island of Oahu. It is protected by a barrier of coral reef, has 21 ft. of water on the bar at low tide, and from 4 to 6½ fathoms inside. It affords safe anchorage and great facilities for the discharging of cargoes, and is easy of access from all quarters and with all winds. Hilo, on the N. E. side of Hawaii, has a good natural harbor, protected seaward by a reef of coral and lava, and with from 3 to 8 fathoms of water. With proper wharves, this would be an excellent harbor. Lahaina, on the island of Maui, has an open roadstead with good anchorage. Kawaihai and Kealakeakua, on the W. side of Hawaii, and Waimea, Koloa, Nawiliwili, and Hanalei, on Kauai, have tolerable harbors.—The climate of the islands

is healthful and remarkably equable, so much so that the Hawaiian language has no word to express the general idea of weather. Extreme heat is never known; the mean temperature of the year at Honolulu is 75° F., and the daily range seldom exceeds 15°. During 12 years the extremes of temperature in the shade were 53° and 90°. At Lahaina the range in 10 years was from 54° to 86°. June is the warmest month, and January the coldest and most rainy. A more bracing climate may be obtained by ascending the mountains; an hour's ride from Honolulu up the Nuuanu valley will give a lower temperature. Above Lahaina, at an elevation of 3,000 ft., the thermometer ranges from 40° to 75°; and at Waimea, on Hawaii, the average temperature is 64°. On the windward side of the islands the climate is rougher and the rainfall more abundant. Honolulu and Lahaina, from their genial climate, are particularly adapted for the residence of invalids. Much of the island scenery is extremely beautiful.—The indigenous fauna of the islands is small. It consists of swine, dogs, rats, a bat which flies by day, and domestic fowls, which appear to be native. Snipes, plovers, and wild ducks are found on all the islands. There are only a few species of singing birds; many species, however, have beautiful plumage. One of the birds, *melithreptes Pacifica*, has under each wing a small tuft of feathers of a golden yellow color and about an inch in length. The war cloak of Kamehameha I. was made of these rare feathers; it was 4 ft. long and 11½ wide at the bottom, and its formation is said to have occupied nine successive reigns. Many varieties of fish frequent the shores, and form a staple of diet with the natives. The indigenous flora numbers about 373 species, and many more have been introduced. The coconut, banana, breadfruit, pandanus, cordyline (*ki*), and taro or kalo (*arum esculentum*) are probably indigenous. The last forms the principal food of the natives. The productions of the islands are sugar, rice, coffee, cotton, sandal wood, tobacco, arrowroot, wheat, maize, tapioca, oranges, lemons, bananas, tamarinds, breadfruit, guavas, potatoes, yams, kalo, fungus, wool, hides, tallow, pulu (a fibre collected from the trunks of the tree fern), and ornamental woods. Neat cattle, sheep, goats, and hogs are raised.—The islands lie several hundred miles south of the commercial routes between San Francisco and Japan and China. They are a station for the English line of steamers from California to the Feejee islands and Australia, to which latter market the increasing trade of the South Pacific islands mainly goes. That of the Hawaiian islands is tending in the same direction. A considerable part of the sugar crop of 1873 went to Melbourne and Sydney, where the duty is low. The planters and foreign residents desire a reciprocity treaty with the United States, and in 1856, 1867, and 1869 unsuccessful attempts were made to negotiate one; and still more recently the Hawaiian government of-

ferred to cede the harbor of Pearl river, 6 m. from Honolulu, to the United States, as an inducement to grant such a treaty. As a naval station, the islands offer many advantages to any power that should eventually seek the control of the North Pacific. The commerce is at present chiefly with California; the value of that trade from 1853 to 1873, including freights, passage money, and cargo values inward and outward, exceeded \$19,750,000. The American duties on Hawaiian sugar exported amount to \$225,000, and on rice and other products \$75,000, or \$300,000 annually. The imports from the United States in 1873 exceeded \$1,000,000; they consist chiefly of manufactured goods, lumber, shooks, cured meats, breadstuffs, and groceries. Sugar is the chief export; the amount sent to San Francisco increased from 282,000 lbs. in 1853 to 15,500,000 lbs. in 1872. The total export for 1873 was 23,129,101 lbs. Coffee and cotton are subject to destructive blights. The leading exports in 1873 were:

Sugar, lbs.	23,129,101	Fungus, lbs.	57,533
Molasses, galls.	146,459	Hides, pcs.	20,577
Rice, lbs.	941,433	Pulu, lbs.	412,323
Paddy, lbs.	597,945	Goatskins, packs.	66,702
Coffee, lbs.	232,025	Tallow, lbs.	495,000
Wool, lbs.	329,507	Salt, tons.	445½

The total value of the exports in 1873 was \$2,128,055; of the imports for the same year, \$1,349,448. The number of merchant vessels arriving was 106, with a tonnage of 62,089. The number of cargoes invoiced at above \$10,000 was 34, of which 28 arrived in American, 3 in British, and 3 in Hawaiian vessels. The whaling fleet has fallen off from 549 visits of ships in 1859 to 63 in 1873, it having sought other ports.—Up to the year 1839 the islands were governed as an absolute monarchy and upon feudal principles. In that year Kamehameha III. was induced to sign a bill of rights, and in 1840 and 1842 to grant constitutions by which he surrendered the absolute rule in favor of a government by the three estates of king, nobles, and people, with universal suffrage, a biennial parliament, and paid representatives. The constitution of 1842 and the civil and penal codes were mainly prepared by Chief Justice William L. Lee, an American. Judge Lee rendered great services to the nation, especially in confirming to the common natives a third of the lands of the kingdom, which were formerly owned entirely by the king and chiefs. The new constitution remained in force until the accession of Kamehameha V., who abrogated it Aug. 13, 1864, and promulgated in its place a constitution imposing qualifications on suffrage and on eligibility to the legislature, and centralizing the government in the hands of the king. A voter must read and write, pay his taxes, and have an income of \$75 a year. The executive power is the king, a privy council, of which the four governors of the larger islands are members, and four responsible ministers. The legislative power is the king and the parliament, composed of 14 nobles (of whom 6

are whites) and 28 representatives (of whom 7 are whites). Both classes discuss and vote together. The judiciary power is a supreme court, composed of a chief justice, who is also chancellor, and at least two judges, four district courts, and police and other tribunals. For 1870 and 1871 the entire income of the government was \$912,000, or \$456,000 per year. The salaries called for amount to half of the income; the king is paid \$22,500 a year. Persons of foreign birth or parentage, chiefly Americans, occupy various positions under the government; and the constitution is modelled largely after that of the United States. It guarantees liberty of worship and of the press, free instruction, the right of assembly and of petition, trial by jury, and *habeas corpus*. There is no army or navy; the king has a body guard. In 1843 the Hawaiian kingdom was recognized as an independent sovereignty by France and England, and in 1844 by the United States.—The Hawaiians form one of the families of the brown Polynesian race (radically distinct from the Malay, and more akin to the Papuan, according to Wallace), a race which inhabits also the Marquesas, Tonga, Society, Friendly, and Samoan groups, as well as New Zealand. Their similarity of language is so great that the Hawaiian and the New Zealander, though separated by a distance of 5,000 m., can readily understand each other. The Hawaiian language is very pictorial and expressive, with a full vocabulary for all natural objects. Its primitive character is shown by the deficiency of abstract words and general terms; even generic terms, like insect, color, are wanting; at the same time it abounds in nice distinctions, and is exact in grammatical structure. The American missionaries employed but 12 letters in reducing it to writing, A, E, I, O, U, H, K, L, M, N, P, W; and the number of different sounds is not greatly larger than this. As in all Polynesian languages, every word and syllable must end in a vowel. The ratio of vowel to consonantal sounds is nearly twice as great as in Italian. The Polynesian ear marks the slightest distinctions of vowel sound, but is dull in distinguishing consonants; *b* and *p*, *d* and *t*, are confounded; and in Hawaiian *l* is interchangeable with *d*, and *t* with *k*. The language contains no verb whatever to express either being, existence, possession, or duty.—The Hawaiians are of a tawny complexion, inclining to olive, without any shade of red; the hair is black or dark brown, glossy and wavy; they have large eyes, a somewhat flattened nose, and full lips. They are well made and active, and of good stature; the chiefs are often larger, and considerably exceed the average height of Europeans. Like other Polynesians, they are expert in swimming and in the use of canoes, by which their war expeditions were often carried on. They are good fishermen and horsemen, and make serviceable sailors in the whaling fleets. Their disposition is facile, yielding, and imitative;

they are demonstrative and laughter-loving, and are capable of a fair degree of intellectual and moral elevation. Their songs or *meles* manifest genuine poetic feeling. In arithmetic, geometry, and music they show special aptitude. They are not naturally an industrious race, but they now cultivate the soil with considerable skill; they manufacture sugar, molasses, salt, and arrowroot, and work in iron and other metals. At the time of Cook's visits they had abandoned cannibalism, but were characterized by licentiousness and brutality, and living under the reign of terror imposed by the cruel tyranny of the *tabu*. Their character is not yet essentially civilized, although it has been much modified by education. The population of the islands is steadily decreasing. In 1779 it was roughly estimated by Cook at 400,000, which was doubtless a great exaggeration. An estimate in 1822 gave 142,000. Official censuses have since been made at different periods, which gave: in 1832, 130,313; in 1836, 108,579; in 1850, 84,165; in 1853, 73,138; in 1860, 69,800; in 1866, 62,959; in 1872, 56,899. In the 21 years from 1832 to 1853 the decrease was 44 per cent.; in the 19 years from 1853 to 1872 it was 22 per cent. This lessening rate of decrease, however, must be in part attributed to the increasing number of half-breeds and of foreigners. The number of foreigners upon the islands in 1850 was 1,962; in 1853, 2,119; in 1860, 2,716; in 1866, 4,194; in 1872, 5,366 (1,938 Chinese, 889 Americans, 619 English, 395 Portuguese, 234 Germans, and 88 French). There were 51,531 natives (2,487 half-breeds). The decrease of the aborigines is due to many causes, of which those now principally active may be traced to their contact with the whites. The main cause is that foreign diseases are extremely fatal to them. In 1853 the smallpox carried off 1,200 out of a population of 2,800 in Ewa, near Honolulu. Measles, influenza, and venereal diseases have been prevalent and fatal; licentiousness prevails in spite of missionary effort, and is a considerable check upon population. Diseases of the heart and lungs, dysentery, fevers, and leprosy are frequent. A hospital has been established of late years upon the W. part of Molokai for the seclusion of lepers. The discontinuance of ancient sports, the introduction of foreign dress, and the rapid change in the habits of the people, formerly in natural relation with their circumstances, have tended strongly in the same way. The introduction of clothes appears to have been especially fatal, the Hawaiian being utterly careless about precautions respecting dampness and ventilation. The pure native race seems destined to disappear, and the half-caste population is increasing rapidly. The marriages of the Chinese and Americans with the native women are usually fruitful of healthy children; but marriages between the natives are not prolific. Education has been diffused among the Hawaiians to an extent perhaps unexampled elsewhere. Of

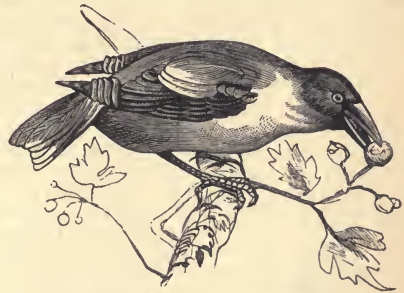
8,931 children between the ages of 6 and 15, 8,287 were attending 245 schools of various grades in 1872. There is one teacher for every 27 children in the group, and scarcely a Hawaiian of proper age cannot read and write his own language. Comparatively little effort has been made to teach the natives English. The schools receive subsidies from the government, and are under its supervision. A number of newspapers, in Hawaiian and English, are sustained. The people maintain churches by voluntary effort, and are extremely liberal in their contributions for various religious objects. A large proportion of the inhabitants are communicants. There is however a tendency to subside into the habits and practices of barbarism, and the native superstitions are with difficulty kept in check. But life and property are as secure as anywhere in the world, and capital offences are extremely rare.—In 1820 the first missionaries from America arrived at the islands. There was no written language; the land was owned by the king and the chiefs, to whom the people were absolutely subject. But Kamehameha II. had just abolished idolatry, and he, and still more his successor, were friendly to the mission, which soon gained great success. The islands rapidly assumed the appearance of a civilized country. In 1822 the language was reduced to writing; and since that time more than 200 works, mostly educational and religious, have been published in Hawaiian. The total number of Protestant missionaries sent to the islands, clerical and lay, including their wives, is 156. The cost of the mission up to 1869 was \$1,220,000. It has been formally discontinued, but a considerable number of the missionaries still remain, supported by their churches or engaged in business. The whole number of persons admitted to the Hawaiian Protestant churches up to 1873 inclusive was 67,792; and the total membership of the same churches in 1873 was 12,283. Several of the Protestant missionaries and their children have filled places in the government. In 1827 a French Catholic mission was established at Honolulu. In 1829 the Hawaiian government directed the priests to close their chapels; some of the proselytes were confined in irons, and Roman Catholic missionaries arriving afterward were not allowed to land. In 1839 the French government sent a frigate to Honolulu, and compelled Kamehameha III. to declare the Catholic religion free to all. The whole number of the Catholic population of the islands in 1872 was stated to be 23,000. An English Reformed Catholic mission was sent out in 1862, and met with favor from Kamehameha V., who was less in sympathy with the Protestant missionaries than his predecessor had been. An Anglican bishop of Hawaii was appointed, who remained till 1870. Since his return in that year to England the mission has attracted less interest, and its success has been small.—These islands were known to the Spaniards more than a cen-

tury before their rediscovery by Capt. Cook in 1778, Hawaii being called Mesa. They first became generally known by the fate of Cook, who was killed by the natives, Feb. 14, 1779. He named the group the Sandwich islands, after Lord Sandwich, then first lord of the admiralty; but the name placed at the head of this article is that which is used at the islands. In 1795-'6 Kamehameha subjugated all of the islands except Kauai, which gave in its allegiance a few years later, and founded the line of kings which ruled the islands until the close of 1872. His successors assumed Kamehameha as a title, prefixing a special name. The dates of their death and succession are as follows: Kamehameha I., May 8, 1819; II. (Liholiho), July 14, 1824; III. (Kauikeaouli), Dec. 15, 1854; IV. (Alexander), Nov. 30, 1863; V. (Lot), Dec. 11, 1872. King Lot dying without leaving an heir or appointing a successor, and the line of Kamehameha I. being extinct, William Lunailo, descendant of an old family of Hawaiian chiefs, was elected king Jan. 8, 1873. He died Feb. 3, 1874, without issue, and David Kalakaua, a high chief, was elected king in his place, by a parliament assembled Feb. 12, 1874, for that purpose.—A full list of works relating to the islands will be found in the "Hawaiian Club Papers" (Boston, 1868). Besides the works of the explorers Cook, Vancouver, Freycinet, Kotzebue, Byron, and Wilkes, and those of the missionary Ellis, the following are among the more important: Dibble, "History" (Lahainaluna, 1843); Jarves, "History" (Boston, 1843; enlarged, Honolulu, 1873); H. T. Cheever, "The Island World in the Pacific" (New York, 1851); Dana, "Coral Reefs and Islands" (New York, 1853), and "Geology of the U. S. Exploring Expedition" (Philadelphia, 1849); G. W. Bates, "Island Notes, by a Haole" (New York, 1854); Andrews, "Grammar of the Hawaiian Language" (Honolulu, 1854), and "Dictionary" (1865); Hopkins, "Hawaii" (London, 1866); Mann, "Flora of the Hawaiian Islands" (Boston, 1868); Brigham, "Notes on Hawaiian Volcanoes" (Boston, 1868-'9); Bliss, "Paradise of the Pacific" (New York, 1873); Nordhoff, "Northern California, Oregon, and the Sandwich Islands" (1874). See also Coan on volcanoes in the "American Journal of Sciences" (1851-'73), and the "Missionary Herald" (1819-'74).

HAWES, Joel, an American clergyman, born in Medway, Mass., Dec. 22, 1789, died at Gilead, Conn., June 5, 1867. He graduated at Brown university in 1813, and, after studying theology at Andover, was settled in the first Congregational church in Hartford, Conn., in 1818, where he became known as an able preacher and writer. He published "Lectures to Young Men" (Hartford, 1828), which has had a very large circulation in the United States and Great Britain; "Tribute to the Memory of the Pilgrims" (1830); "Memoir of Normand Smith" (1839); "Character Everything to the Young" (1843); "The Religion of the

East" (1845); "Looking-Glass for the Ladies, or the Formation and Excellence of Female Character" (1845); "Washington and Jay" (1850); "An Offering to Home Missionaries" (1865); and numerous occasional sermons.

HAWFINCH, a conirostral bird, of the family *fringillidae* and genus *coccothraustes* (Briss.). The common European hawfinch (*C. vulgaris*, Briss.) has a very large bill and head, like other grosbeaks; the neck is short and thick, and the body and limbs are proportionally small. In the male the head is yellowish brown, with the throat and space before the eyes black; fore part of back dark chestnut, the rest brownish gray, shading on the upper tail coverts into yellowish brown; wings with purple gloss and white spots; tail black, the outer feathers with a terminal white spot on the inner web, the inner gray toward the end and tipped with white; below pale yellowish brown; under tail coverts white; the bill flesh-colored, tipped with dusky; the fifth to the eighth primaries have their tips emarginate and the external margins falcate; the ninth, tenth, and five of the secondaries are truncated, the inner edge



Hawfinch (*Coccothraustes vulgaris*).

of the tips rounded, and the outer sharp; the tail is short and straight. The female resembles the male, but the colors are paler. The length is about 7 in., and the extent of wings 11 in. Specimens are often seen more varied with white. It is found in the mountainous and elevated regions of Europe, and is an irregular visitant of Great Britain. It feeds on the seeds of various trees, especially the hornbeam, plane, pines, and cherry, on the kernels of the haws, plum, &c., on laurel berries, and in the summer on various garden vegetables, particularly green peas. The song is pleasant, but plaintive. The nest is very elaborately constructed, of the usual materials, on the highest branches of trees, and the eggs, three to five, are of a pale olive green, with black spots, and irregular streaks of dusky; the young are hatched toward the end of May, and resemble the young green finch; the bill becomes deep blue in the breeding season.

HAWICK, a town and borough of Roxburghshire, Scotland, on the Teviot, 40 m. S. E. of Edinburgh, with which it is connected by rail-

way; pop. in 1871, 11,356. It is divided into nearly equal parts by the river Slitrig. Several of the newer streets contain handsome houses; but old structures may be seen in various parts, having more the look of fortresses than dwellings. There is an elegant new parish church, and an old church, which was the scene of the capture of Sir Alexander Ramsay by Sir William Douglas in the reign of Robert Bruce. There are several other churches, public libraries, and reading rooms, an academy, benevolent institutions, and an exchange, built in 1864. At the upper end of the town is the Moat, an artificial mound, 312 ft. in circumference at the base and 117 at the top, and 30 ft. high, supposed to have been used at first for a burial place, and afterward as a court of justice. The Tower inn was formerly a fortress of the barons of Drumlanrig. Hose, blankets, and flannels are largely manufactured, and gloves, leather, and candles are also made. Branksome tower, famous from Scott's "Lay of the Last Minstrel," is 3 m. from the town.

HAWK, a name indiscriminately applied to many birds of the falcon family, of the sub-families *accipitrinæ*, *buteoninæ*, *falconinæ*, and *milvinae*; indeed, to almost any bird of prey which is not a vulture, an eagle, or an owl. The duck hawk has been described under **FALCON**, the hen hawk under **HARRIER**, and the fish hawk and goshawk under their respective titles; the white-tailed and swallow-tailed hawks are noticed under **KITE**, and the pigeon and sparrow hawks in their alphabetical order; and many are described under **BUZZARD**. The well known American birds of this name which may be most appropriately noticed here are the following.



Accipiter Cooperi.

the eastern parts of temperate North America, less commonly in the west. The flight is very rapid, and near the ground; it is one of the boldest hawks, attacking birds larger than itself; the ruffed grouse, quails, pigeons, and hares are its favorite food. The sharp-shinned

hawk (*A. fuscus*, Gmel.) is a small species, from 11 to 14 in. long, with an extent of wings of 2 ft.; the upper plumage is brownish black, tinged with ashy; under parts light rufous, with transverse white bands; the throat and under tail coverts white, the former streaked



Sharp-shinned Hawk (*Accipiter fuscus*).

with black; tail ashy brown, white-tipped, with about four brownish black bands. It is found throughout North America from Mexico to the arctic regions; it is one of the swiftest and boldest of the hawks, seizing upon birds and animals which it cannot fly away with; its flight is low and irregular, and its direction changed with great quickness; it preys also on reptiles.—The young of all the hawks differ greatly from the adults, having generally a much lighter and white-mixed plumage. The keenness of vision of these birds, sweeping with great rapidity, and often at a considerable height above their prey, is remarkable; to have a "sight like a hawk" has become a proverb. They usually fly low, irregularly, and with sudden change of course, for which their short wings and long tails are well adapted; the falcons, on the contrary, have longer wings and shorter tails, and fly with greater regularity and at considerable elevation, from which they descend with exceeding swiftness; the kites have both the wings and tail elongated, with a corresponding power of rapid and high flight, and the ability of very sudden descent and change of direction. Hawks, and indeed birds of prey generally, are almost always shot at when they come within range of a gun, without any particular reason, except that they are hawks, and of a ferocious disposition; they do no great mischief beyond the occasional stealing of a chicken, hare, grouse, or pigeon, which otherwise would fall a victim to man's appetite; and they are of positive advantage to the agriculturist by destroying animals and birds injurious to vegetation, and noxious reptiles.

HAWKE, Edward, baron, an English admiral, born in 1715, died at Shepperton, Middlesex,

Oct. 14, 1781. He entered the navy at a very early age, and in 1784 had risen to the command of a vessel. Ten years later he was present at the naval battle of Toulon between the English fleet and the combined French and Spanish fleets, on which occasion his ship, the *Berwick*, broke from the line of battle, and captured the Spanish ship *Padre*, of superior force. But as this act of heroism involved a disobedience of orders, Capt. Hawke was tried and dismissed from the service, to which he was immediately restored by George II., who thenceforth called him his own admiral. In 1747 he was made rear admiral of the white, and on Oct. 14 of the same year gained a complete victory over a French squadron off Belleisle on the coast of France. In 1756 he superseded Admiral Byng in the Mediterranean, and subsequently was employed in blockading the French ports in the bay of Biscay. In April, 1758, he drove a French armament destined for America on shore in the Basque roads. In November, 1759, he attacked the French fleet under Conflans in Quiberon bay in the midst of a storm, and, after a memorable and extremely perilous action, the ships being closely engaged among the breakers on the coast, destroyed or captured several of the enemy's vessels, thus preventing the projected invasion of England. For these services he received the thanks of parliament and a pension of £2,000. In 1765 he was appointed vice admiral of England and first lord of the admiralty, and in 1776 was created Baron Hawke of Towton in Yorkshire.

HAWKESWORTH, John, an English author, born in London in 1715 or 1719, died Nov. 17, 1773. He was apprenticed to a clockmaker, and afterward seems to have passed some time in an attorney's office. In 1744 he succeeded Dr. Johnson as compiler of parliamentary debates for the "Gentleman's Magazine." In 1752 he began, in concert with Johnson and Thornton, a series of papers called the "Adventurer," on the plan of the "Rambler." This periodical was published twice a week, and ran through 140 numbers, of which 70 were by Hawkesworth. They were very successful, and procured him from the archbishop of Canterbury the Lambeth degree of LL. D. In 1765 he published an edition of the works of Swift, with a memoir. He was critic in the "Gentleman's Magazine" from 1765 to 1772, when he was selected to prepare for publication, at the cost of the government, an account of Cook's voyage to the South sea, for which he received £6,000. The work appeared in 1773, in 3 vols. 4to, illustrated with maps and cuts, and comprised, besides a digest of Cook's papers, a narrative of the previous voyages of Byron, Wallis, and Carteret. He wrote "Zimri," an oratorio (1760); "Edgar and Emmeline," a fairy drama (1761); "Almorán and Hamet," an eastern tale (1761); and a translation of Fénelon's *Télémaque* (1768).

HAWKING. See FALCONRY.

HAWKINS, a N. E. county of Tennessee, bordering on Virginia, drained by Holston river, here navigable by steamboats; area, 710 sq. m.; pop. in 1870, 15,837, of whom 1,889 were colored. It is traversed by Clinch mountain and other high ridges. Limestone is abundant, and the valleys are fertile. The East Tennessee, Virginia, and Georgia railroad skirts the S. W. border, and a branch terminates at the county seat. The chief productions in 1870 were 138,968 bushels of wheat, 466,470 of Indian corn, 112,306 of oats, 26,124 lbs. of wool, 117,468 of butter, and 3,354 tons of hay. There were 3,192 horses, 3,705 milch cows, 1,298 working oxen, 4,793 other cattle, 16,567 sheep, and 21,700 swine; 2 flour mills, and 2 saw mills. Capital, Rogersville.

HAWKINS, Benjamin Waterhouse, an English artist, born in London, Feb. 8, 1807. He graduated at St. Aloysius college, and afterward studied sculpture under W. Behnes. From 1842 to 1847 he lived at Knowsley, the seat of Lord Derby, engaged in making studies from living animals. He was assistant superintendent of the world's fair in London in 1851. From 1852 to 1855 he was occupied in constructing 33 life-size models of extinct animals for the crystal palace park, many of them colossal. He has lectured in the principal cities of England, Scotland, and America, on geology and zoology, illustrating his lectures by his drawings, and since 1868 has resided in the United States. He has published "Popular Comparative Anatomy" (London, 1840); "Elements of Form" (1842); "A Comparative View of the Human and Animal Frame" (1860); and, in conjunction with Prof. Huxley, "An Elementary Atlas of Comparative Osteology" (1864), and "Artistic Anatomy of the Horse, Cattle, and Sheep, for Art Students."

HAWKINS, Sir John, an English navigator, born in Plymouth about 1520, died in the West Indies, Nov. 21, 1595. In his youth he made several voyages to Spain, Portugal, and the Canary islands, and was engaged for some years in the slave trade. The first adventure from England in this traffic was made by Hawkins in 1562, when he sailed with a small squadron for the coast of Guinea. There he obtained 300 blacks, whom he sold advantageously in Hispaniola (Hayti), and with the profits of this sale was enabled to fit out a second and larger enterprise for the same purpose in 1564. In the following year Queen Elizabeth granted him permission to wear as his crest "a demi Moor in his proper color, bound and captive." He made a third voyage in 1567, for which he received assistance from the queen, and with 500 negroes sailed from Guinea to Spanish America. All trade between the Spanish settlements and foreigners having been prohibited, he found himself unable to dispose of his cargo, and, indignant at the refusal of the governor of Rio de la Hacha to trade with him, he took possession of the town. He then sailed to Cartagena and sold his slaves, but soon after leav-

ing that place he was attacked by the Spanish fleet in the bay of San Juan de Ulua, Mexico, and escaped with but two vessels, with which he made his way to England, arriving in January, 1568. This loss seems to have disheartened him, and he made no more commercial voyages. In 1573 Elizabeth appointed him treasurer of the navy. He served in 1588 as rear admiral against the Spanish armada, and was knighted for his services. In 1590 he was sent with Sir Martin Frobisher to intercept the Plate fleet, and to harass the trade of Spain, but was successful only in the latter object. In 1595 he commanded, in conjunction with Drake, an expedition against the Spanish possessions in the West Indies. The two commanders quarrelled and separated, the attacks upon Dominica and Porto Rico were repulsed, and Hawkins died at sea. He was an able seaman, but rude, cunning, and avaricious. He was twice returned as member of parliament for Plymouth, and once also for another place. He founded at Chatham a hospital for seamen.

HAWKINS, Sir John, an English author, born in London in March, 1719, died May 21, 1789. He was articled to an attorney, but devoted his leisure to literature and the cultivation of music. He subsequently acquired a large fortune in the practice of his profession, and by legacies and marriage. In 1741 he joined the madrigal society, and soon after gained considerable reputation by the publication of several sets of madrigals, for which he furnished the words. In 1749 he was admitted a member of Dr. Johnson's club. About 1760 he began to collect materials for a history of music, which after 16 years of labor was published in 5 vols. 4to, under the title of "General History of the Science and Practice of Music." It suffered somewhat in competition with Dr. Burney's history, published about the same time; but the value of the information which it contains is beyond all question, and it fairly supplies in learning what it lacks in elegance of style. A new edition, with an index, was published in 1853 (2 vols. 4to, London). The library which he had accumulated in the preparation of this work he presented to the British museum. He also published an edition of Walton's "Complete Angler," and a memoir of Dr. Johnson, whose works he edited in 11 volumes.

HAWK MOTH, the proper name of the second or crepuscular division of the order *lepidoptera*, corresponding to the old genus *sphinx* (Linn.), most conveniently divided into the sections of sphinxes, ægerians, and glaucopidians. For the characters of the order both in the perfect and immature state, see BUTTERFLY, and CATERPILLAR. The hawk moths have the antennæ fusiform or thickest in the middle, and generally hooked at the tip; the comparatively narrow wings are retained in a horizontal or slightly inclined position by a bristle or bunch of stiff hairs on the shoulder of each hind wing, which is received by a hook on the under side of each fore wing, the upper ones covering the

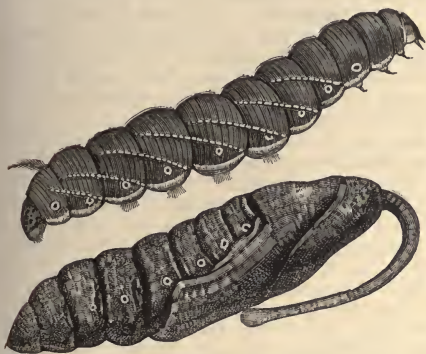
lower; there are two pairs of spurs on the hind legs. Most of these insects fly in the morning and evening twilight, though a few appear by day. Linnæus gave the name of *sphinx* to this group from a fancied resemblance of some of their caterpillars, when at rest, to the Egyptian figure; supporting themselves on the posterior pairs of legs, they raise the fore part of the body, and remain fixed in this position for hours at a time. The adult sphinxes are generally called humming-bird moths from the noise they make when flying, and hawk moths from their hovering and powerful flight; the body is thick and robust, and the strong wings long, narrow, and pointed; with their very long tongues they obtain honey from flowers while on the wing; many are of such size, and have such brilliant colors, that they might readily be taken for humming birds. Some of the ægerians also fly by day; though their flight is swift, it is not prolonged, and they generally alight while feeding; they much resemble bees and wasps; they have a



Hawk Moth (*Sphinx quinquemaculatus*).

tuft at the end of the body which can be extended like a fan. The glaucopidians, so named from the bluish color of the eyes in some of the species, have the antennæ feathered on each side; they fly mostly by day, and alight to take their food. The large green caterpillar, with a horn on the top of the last segment, commonly called potato worm, is a good example of the larva of the sphinx moth. In this division all have 16 legs, in pairs beneath the first to third and sixth to tenth or last segments of the body; and all, except the ægerians and glaucopidians, have a horn or tubercle on the top of the last segment. The sphinx caterpillars devour the leaves of plants on which they are found. The caterpillars of the ægerians are called borers, in common with the larvæ of other orders of insects, from their living concealed within the stems or roots of plants, and feeding upon their interior substance; they are soft, whitish, and slightly downy; they make a cocoon with bits of wood

cemented by gummy matter, within which they are transformed into chrysalids; these are of a shining bay color, having the edges of the abdominal segments armed with rows of short teeth, by means of which they work out of the cocoon and out of the hole in the wood.



Larva and Chrysalis of *Sphinx quinquemaculatus*.

The caterpillars of the glaucopidians are slender, with a few scattered hairs or tufts; they eat the leaves of plants, and undergo transformation in cocoons of coarse silk; the chrysalids are round at one end, tapering at the other, without teeth on the surface; they much resemble the nocturnal moths.—The potato worm, or larva of the *sphinx quinquemaculatus*, with oblique whitish stripes on the sides, grows to a length of 3 or 4 in. and the thickness of the finger; it attains its full size toward the end of August, and often injures the plant by devouring the leaves; crawling into the ground, it remains a chrysalis during the winter, and in the following summer comes out a large moth, measuring 5 in. across the wings; the color is gray, with blackish lines and bands, and five round orange spots encircled with black on each side of the body; the tongue, which when not in use is coiled like a watch spring, may be unrolled to a length of 5 or 6 in. The elm is infested with a pale green caterpillar, about $3\frac{1}{2}$ in. long, with seven oblique white lines on each side, a row of little notches on the back, and four short notched horns on the shoulders; this is the larva of a sphinx (*ceratonia quadricornis*, Harris), and sometimes commits considerable mischief during July and August; these larvæ pass the winter in the earth, and come out in the following June large moths, with an expanse of wings of nearly 5 in.; the color is light brown, varied with darker and with white, with five longitudinal dark brown lines on the hind part of the body. This caterpillar is easily caught in the morning during the season of maturity. Grape and other vines are attacked by the larvæ of the *satellitina* and *achemon* hawk moths, the moth of the former being of a light olive color and expanding 4 or

5 in., and of the latter reddish ash, with brown patches on the thorax and anterior wings, and expanding 3 or 4 in. For details on other sphinxes injurious to vegetation, see the work of Dr. T. W. Harris, "On Insects Injurious to Vegetation." The sphinx caterpillars, being of large size and full of juices, are commonly chosen by the ichneumon flies as the nidus in which to deposit their eggs, the larvæ from which, feeding on the substance of the caterpillar, and frequently spinning their cocoons in great numbers on the outside, so reduce it that the metamorphoses do not take place; multitudes are destroyed in this way.—Ash trees and cucurbitaceous vines suffer much from the boring larvæ of agerians; the former from the *trochilium dentatum* (Harris), of a brown color, with yellow markings, expanding about $1\frac{1}{2}$ in.; the latter from the *ageria cucurbitæ* (Harris), with an orange-colored body spotted with black, and with its fore wings expanding about $1\frac{1}{2}$ in. Peach and cherry trees throughout the United States have of late years been infested with a naked whitish borer, the *ageria* [*T.*] *exitiosa* (Say); the perfect insect is a slender dark blue moth, the males being much the smaller, and differing considerably in marking from the females. For an account of these insects, and the best ways of preventing their ravages, see Dr. Harris's papers in vols. v. and ix. of the "New England Farmer."—The glaucopidian moth (*procris Americana*) is in some years very injurious to vines, stripping off the leaves in mid-summer. Its wings are very narrow, expanding about an inch; the color is blue black, with a saffron collar; the caterpillars are yellowish, with black velvety tufts on each ring, and a few hairs on the end of the body. They are about half an inch long, gregarious, and rather sluggish in their motions; in the southern states several broods are hatched in a season. For a full account see "Hovey's Magazine" for June, 1844.—Many species of all these sections are found in Europe, where their habits have been carefully observed.



Ageria exitiosa.

HAWKS, Francis Lister, an American clergyman, born in New Bern, N. C., June 10, 1798, died in New York, Sept. 26, 1866. He graduated at the university of North Carolina in 1815, studied law and practised with great success for several years, and was elected to the legislature. He resolved however to enter the ministry of the Protestant Episcopal church, and was ordained in 1827. He officiated for a time as assistant minister in New Haven, and in St. James's church, Philadelphia, and in 1830 was chosen professor of divinity in Washington (now

Trinity college, Hartford. In 1831 he became rector of St. Stephen's church, New York, and at the close of the year of St. Thomas's church in the same city, where he officiated till 1843. Having been appointed by the general convention of 1835 historiographer of the American Episcopal church, he went to England, and obtained numerous important papers relating to the early history of Episcopacy in America. In 1837 he founded, with Dr. C. S. Henry, the "New York Review," of which he was for some time editor and a principal contributor. In 1839 he founded St. Thomas's hall, at Flushing, L. I., a school specially for the sons of the clergy, but through its failure became heavily involved in debt. In 1843 he removed to Mississippi, of which diocese he was elected bishop the same year. His consecration was opposed in the general convention of 1844, on account of charges connected with his financial embarrassments. His character was fully vindicated, and a vote of acquittal was passed, but he refused to accept the bishopric. At the end of 1844 he became rector of Christ church, New Orleans, where he remained five years, being meanwhile elected first president of the university of Louisiana. In 1849 he became rector of Calvary church, New York, his pecuniary embarrassments and those of the church having been relieved by a large subscription. In 1852 he was elected bishop of Rhode Island, but declined. At the outbreak of the civil war Dr. Hawks, whose sympathies were strongly with the south, resigned his charge, and in 1862 became rector of Christ church, Baltimore. In 1865, however, he returned to New York, where the chapel of the Holy Saviour was begun for him; and his last public act was the laying of the corner stone in September, 1866. He was the author of "Reports of Cases adjudged in the Supreme Court of North Carolina, 1820-'26" (4 vols. 8vo, Raleigh, 1823-'8); "Digest of all the Cases decided and reported in North Carolina;" "Contributions to the Ecclesiastical History of the United States" (2 vols. 8vo, embracing Virginia and Maryland, New York, 1836-'41); "Commentary on the Constitution and Canons of the Protestant Episcopal Church in the United States" (8vo, 1841); "Egypt and its Monuments" (8vo, 1849); and "Auricular Confession in the Protestant Episcopal Church" (12mo, 1850). Dr. Hawks translated Rivero and Tschudi's "Antiquities of Peru" (1854), and edited "The Official and other State Papers of the late Maj. Gen. Alexander Hamilton" (8vo, 1842); "Narrative of Commodore Perry's Expedition to the China Seas and Japan in 1852-'4" (8vo and 4to, 1856), compiled from Perry's original notes and journal; the "Romance of Biography" (12 vols.); Appleton's "Cyclopædia of Biography" (1856); and "History of North Carolina" (1857).

HAWK'S BILL. See **TURTLE**.

HAWKSMOOR, Nicholas, an English architect, born in 1666, died in 1736. He was a pupil of

Sir Christopher Wren, after whose death he was surveyor of Westminster abbey, and designed many of the edifices erected in pursuance of the statute of Queen Anne for building 50 new churches. He is also said to have been associated with Sir John Vanbrugh in building Castle Howard and Blenheim.

HAWKWOOD, Sir John (called by the Italians GIOVANNI ACUTO), an English military adventurer in the 14th century. He fought for the Viscontis and for Gregory XI., and so daring were his ravages of the Florentine territory, that he was paid 130,000 golden florins as a ransom. In Naples he sided with Charles III. against Louis of Anjou. In the course of a campaign in the contest between Florence and the Viscontis, shortly before his death, Hawkwood pitched his camp on a hill. Jacopo del Verme, another leader of condottieri, opened the dikes of the Adige, and surrounded the hill with water, sending at the same time a fox in a cage as a present to Acuto. His reply was: "Good; but the fox does not look at all sad; he will find his way out." He found a crossing place, and cut his way through his opponents.

HAWLEY, Gideon, an American missionary, born in Stratford (now Bridgeport), Conn., Nov. 5, 1727, died in Marshpee, Mass., Oct. 3, 1807. He graduated at Yale college in 1749, and commenced his labors at Stockbridge in 1752, opening a school at that place, in which he instructed a number of Mohawk, Oneida, and Tuscarora families. In 1754, under the patronage of Sir William Johnson, he began a mission among the Iroquois, or Six Nations, on the Susquehanna river; but in 1756 he was obliged by the disturbances of the French war to leave that region, when he became a chaplain in the army marching against Crown Point. The campaign being over, he reëngaged in his missionary work at Marshpee, where he was installed as pastor in 1758, and there passed the remainder of his life.

HAWLEY, Joseph, an American revolutionist, born in Northampton, Mass., in 1724, died March 10, 1788. He graduated at Yale college, and practised law at Northampton. At the time of the disputes between Great Britain and America, he took a prominent part in advocating the cause of the colonies. "We must fight," he wrote to the delegates of Massachusetts, "if we cannot otherwise rid ourselves of British taxation. The form of government enacted for us by the British parliament is evil against right, utterly intolerable to every man who has any idea or feeling of right or liberty." He was several times elected a member of the council, but declined, preferring to occupy a seat in the state legislature, of which from 1764 to 1776 he was an influential member. From a violent opposer of the ecclesiastical measures of Jonathan Edwards, whose removal from Northampton he had been active in effecting, he became his warm advocate, and in 1760 wrote a letter deploring his part in the affair.

HAWTHORN. See **THORN**.

HAWTHORNE. I. Nathaniel, an American author, born in Salem, Mass., July 4, 1804, died at Plymouth, N. H., May 19, 1864. His ancestors, who came from England, had settled at Salem in the early part of the 17th century. The Hawthornes in that century took part in the persecution of the Quakers and the witches. For a long period the men of the family followed the sea; "a gray-headed shipmaster in each generation retiring from the quarter-deck to the homestead, while a boy of 14 took the hereditary place before the mast, confronting the salt spray and the gale, which had blustered against his sire and grandsire." The father of Nathaniel Hawthorne was a shipmaster who died of yellow fever in Surinam in 1808. His mother, whose maiden name was Manning, was a woman of great beauty and extreme sensibility. Her grief at her husband's death was hardly mitigated by time, and for the rest of her life she lived a mourner in absolute seclusion. For more than 30 years she took her meals alone in her chamber. At the age of 14, on account of feeble health, Nathaniel Hawthorne was sent to live on a farm belonging to his family in Raymond, on the borders of Sebago lake in Maine. He returned to Salem for a year to complete his studies preparatory to entering Bowdoin college, where he graduated in 1825, in the same class with George B. Cheever and Henry W. Longfellow. Franklin Pierce, who was in the preceding class, was his intimate friend. After quitting college he resided many years in Salem, leading a solitary life of meditation and study, a recluse even from his own household, walking out by night and passing the day alone in his room, and writing wild tales, most of which he burned, and some of which appeared in newspapers, magazines, and annuals. In 1828 he published in Boston an anonymous romance, called "Fanshawe," which he never acknowledged, and which has not been reprinted. In 1836 he went to Boston to edit the "American Magazine of Useful Knowledge," of which he wrote the whole, and for which, owing to the insolvency of the publishers, he received no pay. In 1837 he collected from the annual called "The Token" and from other periodicals a number of his tales and sketches, and published them at Boston under the title of "Twice-told Tales." The book was noticed with high praise in the "North American Review" by Mr. Longfellow, who pronounced it the work of a man of genius

and of a true poet, but it attracted little attention from the general public. Gradually, however, it found its way into the hands of the more cultivated and appreciative class of readers; and in 1842 a new edition was issued, together with a second series of tales collected from the "Democratic Review" and other magazines. These volumes, says Mr. George W. Curtis, are "full of glancing wit, of tender satire, of exquisite natural description, of subtle and strange analysis of human life, darkly passionate and weird." In 1838 Mr. Bancroft the historian, then collector of the port of Boston, appointed Mr. Hawthorne a weigher and gauger in the custom house. He fulfilled his novel duties well, was a favorite with the sailors, it is said, and held his office till after the inauguration of President Harrison in 1841, when, being a democrat, he was displaced to make room for a whig. After leaving the custom house he went to live with the



The Old Manse at Concord, Mass.

association for agriculture and education at Brook Farm in West Roxbury, Mass., of which he was one of the founders. He remained here a few months, "belaboring the rugged furrows;" but before the year expired he returned to Boston, where he resided till 1843, when he married Miss Sophia Peabody and took up his abode in the old manse at Concord, which adjoins the first battle field of the revolution, a parsonage which had never before been profaned by a lay occupant. In the introduction to the volume of tales and sketches entitled "Mosses from an old Manse" (New York, 1846), he has given a charming account of his life here, of "wild, free days on the Assabet, indulging fantastic speculations beside our fire of fallen boughs with Ellery Channing, or talking with Thoreau about pine trees and Indian relics in his hermitage at Walden." These "Mosses" were mostly written in the old manse, in a delightful little nook of a study

in the rear of the house, from whose windows the clergyman of Concord watched the fight between his parishioners and the British troops on April 19, 1775. In the same room Emerson, who once inhabited the manse, wrote "Nature." Mr. Hawthorne resided in Concord for three years, mingling little with the society of the village, and seeking solitude in the woodland walks around it, or in his boat on the beautiful Assabet, of which in his "Mosses" he says: "A more lovely stream than this, for a mile above its junction with the Concord, has never flowed on earth—nowhere, indeed, except to lave the interior regions of a poet's imagination." In 1846 Mr. Hawthorne was appointed surveyor of the port of Salem. He carried his family thither, and for the next three years he was the chief executive officer in the decayed old custom house, of which and its venerable inmates he gave a graphic and satirical sketch in the introduction to "The Scarlet Letter" (Boston, 1850), a powerful romance of early New England life, which became at once exceedingly popular, and established for its author a high and wide-spread reputation. In 1849, the whigs having regained control of the national government, Mr. Hawthorne was again removed from office. Retiring to the hills of Berkshire, he settled in the town of Lenox, in a little red cottage on the shore of the lake called the Stockbridge Bowl. Here he wrote "The House of the Seven Gables" (Boston, 1851), a story the scene of which is laid in Salem in the earlier part of the present century. It was not less successful than "The Scarlet Letter," though its striking and sombre effect is wrought out of homely and apparently commonplace materials, and its strain of horror is prolonged almost to tediousness. This was followed by "The Blithedale Romance" (Boston, 1852), in which, as he says in the preface to the book, he "has ventured to make free with his old and affectionately remembered home at Brook Farm, as being certainly the most romantic episode of his own life." The characters of the romance, he says, are entirely fictitious, though the scene of Brook Farm was in good keeping with the personages whom he desired to introduce. "The self-conceited philanthropist; the high-spirited woman bruising herself against the narrow limitations of her sex; the weakly maiden, whose tremulous nerves endow her with sibylline attributes; the minor poet, beginning life with strenuous aspirations, which die out with his youthful fervor; all these might have been looked for at Brook Farm, but, by some accident, never made their appearance there." In 1852 Mr. Hawthorne returned to Concord, where he purchased a house and a few acres of land, intending to make it his permanent home. During the presidential canvass of 1852 he published a life of his college friend Franklin Pierce, the democratic candidate. President Pierce in 1853 appointed his biographer to one of the most lucrative

posts in his gift, the consulate at Liverpool. Mr. Hawthorne held this office till 1857, when he resigned it, and for two years travelled with his family in France and Italy, residing for a good while in Rome and in Florence. He returned to Concord in the latter part of 1860, and lived here quietly until his health failed, and in the spring of 1864 he set out on a journey through New Hampshire with ex-President Pierce. He reached a hotel in the town of Plymouth, where he stopped for the night, and was found dead in his bed in the morning. Among his works not already mentioned are: "True Stories from History and Biography" (Boston, 1851); "The Wonder Book for Girls and Boys" (1851); "The Snow Image and other Twice-told Tales" (1852); and "Tanglewood Tales," a continuation of "The Wonder Book" (1853). Each of these is in 1 vol. 12mo. In 1845 he edited "The Journal of an African Cruiser" (New York), from the MSS. of a naval officer, Lieut. Horatio Bridge. His longest and perhaps his best work, "The Marble Faun," a romance of Italy, was published in Boston in 1860, and in the same year reprinted in London with the title "Transformation." His next work, "Our Old Home," a series of English sketches contributed to the "Atlantic Monthly," was published in a volume in 1863. This was the last of his books that appeared during his life. After his death his wife edited from his diaries, which he kept with remarkable regularity, his "American Note Books" (1868), "English Note Books" (1870), and "French and Italian Note Books" (1872). In 1872 "Septimius Felton, or the Elixir of Life," a psychological romance, the scene of which is laid in Concord in 1775, was found among his manuscripts and edited by his daughter Una. Some chapters of "The Dolliver Romance," an unfinished work, were published in the "Atlantic Monthly" in 1864. A complete edition of his writings was issued in Boston in 1873, in 21 vols. 16mo. Mr. Hillard of Boston, one of Hawthorne's most intimate friends, says of him in an article in the "Atlantic Monthly" for 1870: "He was a man as peculiar in character as he was unique in genius. In him opposite qualities met, and were happily and harmoniously blended; and this was true of him physically as well as intellectually. He was tall and strongly built, with broad shoulders, deep chest, a massive head, black hair, and large, dark eyes. Wherever he was, he attracted attention by his imposing presence. He looked like a man who might have held the stroke oar in a university boat. And his genius, as all the world knows, was of masculine force and sweep. But, on the other hand, no man had more of the feminine element than he. He was feminine in his quick perceptions, his fine insight, his sensibility to beauty, his delicate reserve, his purity of feeling. No man comprehended woman more perfectly; none has painted woman with a more exquisite and

ethereal pencil. And his face was as mobile and rapid in its changes of expression as is the face of a young girl. His lip and cheek heralded the word before it was spoken. His eyes would darken visibly under the touch of a passing emotion, like the waters of a fountain ruffled by the breeze of summer. So, too, he was the shyest of men. The claims and courtesies of social life were terrible to him. The thought of making a call would keep him awake in his bed. At breakfast, he could not lay a piece of butter upon a lady's plate without a little trembling of the hand—this is a fact, and not a phrase. He was so shy that in the presence of two intimate friends he would be less easy and free-spoken than in that of only one.”

II. Sophia Peabody, an American authoress, wife of the preceding, born in Salem, Mass., in 1810, died in London, England, Feb. 26, 1871. She was married to Hawthorne in 1843, having made his acquaintance by illustrating one of his “Twice-told Tales,” “The Gentle Boy.” She had considerable artistic talent, and after the death of her husband devoted herself to editing his “Note Books.” In 1868 she published a volume of her own observations entitled “Notes in England and Italy.” She was residing in England with her two daughters when she died.

III. Julian, an American author, son of the preceding, born in Boston, June 22, 1846. He went to Europe with the rest of the family in 1853, and remained there till 1860, when he came home to Concord. There he went to school for three years, his previous education having been entirely domestic. In 1863 he entered Harvard college, in the class which graduated in 1867; but his attendance was very irregular, and he did not graduate. In 1868 he entered the scientific school of the university, but gave more attention to rowing and other muscular exercises than to his studies. He rowed in the college regatta in the summer of that year, and in the autumn went to Dresden in Germany, where he resided nearly two years, studying engineering. He came to New York in 1870, and was employed till 1872 as an engineer in the department of docks. In November, 1870, he married an American lady of German descent, whose acquaintance he had made in Dresden. In 1871 he began to write stories and sketches for the magazines, and in 1873 published in London and New York a novel entitled “Bresant.” In 1872 he went with his family to Dresden, where he now (1874) resides.

HAXTHAUSEN, Franz Ludwig Marie August, baron, a German author, born near Paderborn, Feb. 3, 1792, died in Hanover, Dec. 31, 1866. He was a wealthy land owner, served in the army, studied at Göttingen, and travelled extensively, especially in Russia. His works include *Die Agrarverfassung und ihre Conflicte* (Berlin, 1829); *Die ländliche Verfassung der Provinz Preussen* (Königsberg, 1838); *Studien über die innern Zustände, das Volksleben und insbesondere die ländlichen Einrichtungen*

Russlands (3 vols., Hanover, 1847-'52), a book which attracted great attention in Russia; *Transkaukasien* (2 vols., Leipsic, 1856); *Das constitutionelle Princip* (French and German, 2 vols., 1865); and *Die ländliche Verfassung Russlands* (1866).

HAY, John, an American author, born in Salem, Ill., Oct. 8, 1839. He was educated at Brown university, studied law at Springfield, Ill., and had just been admitted to the bar when he received the appointment of private secretary to President Lincoln (1861). He remained with the president almost constantly until his assassination in 1865, but served as a staff officer for several months in the field during the civil war. In 1865 he was appointed secretary of legation at Paris, where he remained till 1867, when he was transferred to Vienna. Here he was for some time chargé d'affaires; and in 1868 he was again transferred to Madrid as secretary. In 1870 he returned to America, and became attached to the staff of the “New York Tribune.” He has written “Pike County Ballads” and “Castilian Days,” both published at Boston in 1871.

HAY COLD, Hay Asthma, or Hay Fever, an affection first described by Dr. John Bostock in 1819, under the name *catarrhus astivus*. The local symptoms denote subacute inflammation of the nostrils (coryza), and of the bronchial mucous membrane (bronchitis), together with irritability of the eyes, and, in a certain proportion of cases, bronchial spasm or asthma. More or less fever and other evidences of constitutional disturbance accompany the affection. The foregoing names imply that the cause is contained in emanations from hay. Observations show that fresh or newly mown hay causes the affection in some persons; but this expression of the causation is not sufficiently comprehensive, as other emanations from the vegetable kingdom give rise to it. The special cause or causes contained therein have not as yet been ascertained. It is probable that different persons are affected by the products of different kinds of vegetation, diffused in the atmosphere. The peculiar susceptibility to their influence is inherent in the system; that is, it is an idiosyncrasy; and this idiosyncrasy is manifested only during the summer or autumnal months. In some cases the affection occurs in successive years precisely at the same period, and has a uniform duration. It rarely if ever persists or is developed after the occurrence of black frosts. It appears to be unknown in the southern states and in the northern regions of Canada. It is never developed on the sea; and persons suffering from it find instant and complete relief after the first 12 or 24 hours of a sea voyage. Relief is also obtained in situations where there is little or no vegetation. These facts render it certain that the cause is contained in the atmosphere, and that it is of vegetable origin. The affection has been elaborately studied by Dr. Morrill Wyman, author of a work entitled

"Autumnal Catarrh (Hay Fever)" (1872). According to this author, there are two forms of annually recurring bronchial inflammation (catarrh) in the northern part of this country, affecting persons with a peculiar idiosyncrasy. The first is often called the rose cold or June cold, commencing in the latter part of May or early in June, and continuing into July. This corresponds to the affection known in England as hay asthma or hay fever. The other form is called by Dr. Wyman *catarrhus autumnalis* or autumnal catarrh. In this form the affection begins generally in the third or fourth week of August, and ends in the latter part of September or in October. Dr. Wyman has collected facts which show that relief may be obtained by going to certain portions of the White Mountain region, to Mount Mansfield in Vermont, to the Adirondack mountains, or generally to any point lying 800 ft. above the sea. Persons who suffer from the affection in the places in which they reside, may secure relief and exemption by various changes of residence, to be determined in each case by individual experience, inasmuch as the particular agencies are unknown. The treatment of the affection, when removal without the region in which the cause exists is not practicable, must consist of palliative measures. Iodide of potassium, and the salts of bromine, arsenic, and strychnine, have been found useful. Prof. Helmholtz has discovered vibrio-like organisms in the nasal secretions in this complaint, whose action is arrested by the local employment of quinine.

HAYDEN, Ferdinand Vandever, an American geologist, born in Westfield, Mass., Sept. 7, 1829. He emigrated to Ohio at an early age, and graduated at Oberlin college in 1850. He afterward studied medicine at the Albany medical college, taking his degree in 1853. In the spring of that year he visited the "Bad Lands" of Dakota on White river in the interest of Prof. James Hall, explored one of the remarkable ancient deposits of extinct animals, and returned with a large and valuable collection of fossil vertebrates. He again ascended the Missouri river for the American fur company in the spring of 1854, and spent two years in exploring the upper Missouri, entirely at his own expense, returning in 1856 with another large collection of fossils, a part of which was deposited in the academy of sciences of St. Louis, and a part in that at Philadelphia. These collections attracted the attention of the officers of the Smithsonian institution, and he was appointed geologist on the staff of Lieut. G. K. Warren of the topographical engineers, who was then making a reconnaissance of the northwest, and continued on this duty till 1861, when he entered the army as a medical officer. In 1864 he was assistant medical inspector of the department of Washington, and in the autumn of the same year chief medical officer of the army in the Shenandoah valley. In 1865 he was elected professor of geology and mineralogy in the university of Pennsyl-

vania, and held that post till 1872, when he resigned on account of the increased labor in managing the survey. In the summer of 1866 he made another expedition to the upper Missouri in behalf of the academy of sciences of Philadelphia, bringing back another valuable collection of vertebrate fossils. The United States geological survey of the territories, under charge of Prof. Hayden, was commenced in the spring of 1867 with an appropriation of \$5,000; continued in 1868 with \$5,000, in 1869 with \$10,000, in 1870 with \$25,000, in 1871 with \$40,000, in 1872 with \$75,000 and \$10,000 for engraving, and in 1873 with \$75,000 and \$20,000 for engraving. Seven annual reports of the survey have been published, and a final report on Nebraska, in octavo, besides 3 vols. 4to, with illustrations. Besides his reports, Dr. Hayden has written about 40 scientific papers, published in the "American Journal of Science," in the proceedings of the academy of sciences of Philadelphia, and in the reports of the Smithsonian institution. He is a member of the national academy of sciences, and of many other American and European societies. Dr. Hayden has occupied about 20 years in exploring the west, and has extended his investigations over much of Kansas, Nebraska, Colorado, Dakota, Montana, Idaho, Utah, and New Mexico.

HAYDN, Joseph, a German composer, born at Rohrau, Lower Austria, March 31, 1792, died in Vienna, May 31, 1809. He was the eldest of the 20 children (by two mothers) of Matthias Haydn, a wheelwright. In his fifth year his musical talents attracted the notice of Frank, a school teacher of Haimburg, who advised the parents to give their son a musical education. When six years old he was sent to the school at Haimburg, where he learned reading, writing, singing by note, and all the instruments then usual in orchestras which his strength would admit of his playing. He had come to Haimburg at a season of numerous religious processions, and the drummer had just died. Frank gave the child a lesson or two, and a few days after the people of the town laughed to see their processions led by a boy of six years beating a drum, which was mounted upon a humpbacked dwarf. His voice proved to be one of remarkable power, sweetness, and compass, and attracted the notice of the parish priest, who afterward recommended him to Reuter, chaplainmaster of the cathedral of St. Stephen's in Vienna, as a choir boy. Reuter examined him, gave him a single lesson in the execution of the shake or trill, ordered him to practise singing the scale daily, and at eight years of age received him into the choir. The number of boys in the choir was six, for the support and instruction of each of whom Reuter received 700 florins (about \$300), a sum amply sufficient in those days for their handsome support, and to furnish them with the best teachers. In the case of Haydn, and doubtless of the others, a large proportion of the 700 florins

went into Reuter's pocket; for, with the exception of a little Latin and much practical music, Joseph seems to have been taught nothing. In the theory and science of the art he received in eight years but two lessons from his master. His physical wants were as ill supplied as those of his mind. Hunger during these years was a spur to him in the study of singing, he having early learned that his beautiful voice could be made to procure him food. Constant practice in singing the music of the best Italian and German ecclesiastical composers made up in some measure for the want of adequate instruction in musical theory; his natural instinct for correct harmony and counterpoint being developed in spite of his ignorance of rules. With little bread, little instruction, and many a beating from Reuter, Joseph reached his 16th year, when his voice began to break, and his master, seeing that he could no longer make him a source of profit, sought a fit occasion to dismiss him. Joseph was often in difficulty from his practical jests. One of these gave Reuter the wished-for occasion. One of the boys wore his hair long and tied in a queue. Joseph, to bring him into uniformity with the others, took opportunity to cut it off, and being complained of was sentenced to a severe castigation upon the open hand. He begged hard to be let off, offering to resign if his punishment were remitted. "No help for you," said Reuter; "you shall first receive your *Schilling* and then march." The boy of 16 was turned into the streets of Vienna with a threadbare coat and three bad shirts. His parents, to whom he went, could not aid him, and besought him to carry out the old plan and enter the church. What he had seen of the lower clergy during his eight years in St. Stephen's had not increased his liking for such a life, and he returned to Vienna to see what could be done in music. He took up his abode in a garret room of a five-story house, where he had neither stove nor fireplace, and where rain and snow penetrated through the holes in the roof. Among the first friends whom the boy found was a widow, who with her daughter lived by knitting; she gave him permission to sleep on the floor in her own room when the winter came. She afterward fell into extreme want. Haydn was then in prosperity; in his good fortune he remembered her, and for 30 years gave her a small monthly pension. It was at this period that his genius received its permanent direction. The first six sonatas of C. P. E. Bach fell into his hands. "I could not leave my instrument," said he in his old age, "until I had played them through; and whoever thoroughly understands me, must see that I owe very much to Emanuel Bach; that I comprehended and industriously studied him. Emanuel Bach himself sent me a compliment for this." After a time he attracted the notice of Metastasio, who lived in the same house. The poet had charge of the education of a Signora Martinez, then a child, and Haydn was

employed to give her rudimental instructions in music, thus having opportunity to make himself a thorough master of the Italian language. Through Metastasio he became acquainted with Porpora, who was then in Germany giving singing lessons to the mistress of Correr, the Venetian ambassador. Thus far Haydn had had no opportunity of studying the theory of music with a master, nor been able to purchase books for this purpose. It was therefore of the greatest importance to him to have the benefit of the profound knowledge and experience of Porpora. Porpora, too, wished for some one to play the accompaniments when he gave his lessons. That he received lessons from Porpora directly, save such as were necessary to render him adequate to the old master's demands upon him, is very doubtful; but he derived the highest advantage from being present at the lessons, and willingly bore the old man's ill humor. During a visit of three months to the baths of Mannersdorf, Correr took his mistress and her teacher, and Haydn chose to act during that time as Porpora's servant rather than miss the opportunity of improving himself. He wore no livery, and dined at the table of Correr's officials, not at that of the servants. He was known as Porpora's accompanist, and in this capacity attracted the notice of Gluck, Wagenseil, and other musical notabilities of Vienna. His salary was then six ducats a month. From this time his prospects were continually brighter. A Baron Fûrnberg often invited him to his house both in the city and in the country, to small musical parties; and for him, during the autumn of 1750 or the winter following, Haydn composed his first quartet for stringed instruments. Returning one day to his lodgings, he found that his clothes and a few other possessions had been stolen; but he had already made friends, and one of them gave him a good suit of black, another linen, &c., and Fûrnberg took him for two months to his country seat. From 1751 to 1759 his life was that of a successful young music teacher. His fees for instruction gradually rose from two to five florins per month. Sundays and church festivals were busy days with him; at 8 in the morning he played the organ in the chapel of the Carmelites, at 10 in the chapel of Count Haugnitz, and at 11 he sang (tenor) in his old choir at St. Stephen's, receiving for each service 17 kreutzers. He was often employed in serenading, his own music generally forming part of the programme. One evening the handsome wife of Kurz, a famous harlequin, was the recipient of the serenaders' homage, and the husband was so struck by the music as to go down to the street and ask who was its author. Haydn, then about 20, acknowledged it. Kurz had the text for a short comic opera, *Der hinkende Teufel* ("The Limping Devil"), a satire on the lame theatre director, Affligio, and this he persuaded Haydn to compose. The piece was given three times with applause, and then forbidden by the police. Haydn received

for his work 24 ducats. Having now the means, he determined to make himself master of the science of music, and to reduce to order what he had previously acquired by observation and practice. His first purchase was the theoretical work of Emanuel Bach, which appeared in 1753. Then came Mattheson's *Vollkommener Kapellmeister*, and finally Fux's *Gradus ad Parnassum*. To these works he devoted a most thorough study, giving the preference on the whole to Bach, although he afterward used Fux as his text book in teaching on account of the excellence of his method. His own pen was never idle. Besides his exercises in harmony and counterpoint for his own improvement, he wrote pieces in infinite variety for his pupils, which fell into the hands of publishers and made him known, though they gave him no pecuniary profit. In 1759, at the age of 27, he at length obtained an appointment. A Bohemian, Count Morzin, engaged him as music director and composer, with a salary of 200 florins, free lodgings, and table with his secretaries and other officials. Haydn now resolved to marry. A hair dresser, Keller, in the Landstrasse, Vienna, had often aided him in his days of want, and in return Haydn had instructed the eldest daughter in music, and to her lost his heart. But she had chosen to enter a convent, and, urged by gratitude and the persuasions of Keller, he transferred his proposal to her sister, and married her. She proved but a sorry match for the chapelmaster. She had few truly feminine qualities, and was disposed to squander Haydn's earnings. Morzin would have no married men in his orchestra, and Haydn was obliged to keep his marriage secret. It was during this year that Haydn wrote his first grand symphony for full orchestra. Before the winter of 1759-'60 was over, which Morzin spent in Vienna, he found it necessary to reduce his expenses, and one step was to dismiss his orchestra. This was no loss to Haydn, for Prince Nicholas Esterházy had heard his symphony, and in 1760 appointed him chapelmaster. This position Haydn held without interruption until Esterházy's death, full 30 years, spending eight or nine months of the year at Eisenstadt or at Eszterház in Hungary, and the winter in Vienna. His salary, at first 400 florins, was gradually increased to 1,000. The prince was ever ready with his purse, and thrice when Haydn's house in Eisenstadt was burned, Esterházy rebuilt it at his own expense. In his will he gave Haydn a pension equal to his salary for life, and his successor, though he dismissed his orchestra, continued to Haydn his title of chapelmaster, and added 400 florins to his pension. The composer had free range of the fields and forests of the prince, and could gratify his passion for shooting and fishing to his heart's desire. It cost him little to live in the country, with no family but a wife and a servant or two; and but for Frau Haydn's propensity to squander her husband's earnings, he might

have saved a handsome share of his emoluments. A French traveller who visited Eszterház about 1782 says: "The château stands quite solitary, and the prince sees nobody but his officials and servants, and strangers who are drawn hither from curiosity. He has a puppet theatre, which is certainly unique in character. Here the grandest operas are produced. One knows not whether to be amazed or to laugh at seeing *Alceste*, *Alcides*, *Al bivio*, &c., put upon the stage with all due grandeur and played by puppets. His orchestra is one of the best I ever heard, and the great Haydn is his court and theatre composer. He employs a poet for his singular theatre, whose humor and skill in suiting the grandest subjects to his stage, and in parodying the gravest pieces, are often exceedingly happy. He often engages a troop of wandering players for months at a time, and he himself with a few officials and servants forms the entire audience. They are allowed to come upon the stage uncombed, drunk, their parts not half learned, and half dressed. The prince is not for the serious and the tragic, and he enjoys it when the players, like Sancho Panza, give loose reins to their humor." For this prince Haydn, ever ready with new and excellent music in which no tragic tones resounded, was just the man. Haydn said of him toward the close of his life: "My prince was satisfied with all my works; I received applause; as chief of the orchestra, I could try experiments, observe what produced the right effect and what weakened it; could therefore improve, add, cut out, venture. I was separated from the world, nobody to meddle with and plague me, and so I was perforce original." The demand upon him for church and instrumental music was constant; for theatrical music frequent; and the best of the year's productions in the country came in the winter to a hearing in Vienna before the highest musical circle in Europe. Thus ten years had not passed since entering the service of Esterházy before the name of Haydn had a European reputation, and the publishers of Leipsic, Berlin, Hamburg, and even of more distant cities, vied with those of Vienna in giving his works to the world. Anything like a complete catalogue of his compositions during these 30 years is impossible; much was lost when his houses were burned, much was scattered; but we know of 163 pieces for the baryton, from the solo with pianoforte to the octet and grand concerto; of symphonies for full orchestra, at least four per annum; of a score or two of masses and other works for divine service in the prince's chapel; of more than 100 works of chamber music of the higher forms, with an immense number of simpler construction. At least 12 Italian operas by him were performed in the private theatre, and four German operettas by the marionettes. The oratorio *Il ritorno di Tobia* was composed in 1774 for the "Musicians' Widows and Orphans Society" in Vienna, he being a candidate for admission. On learning that he must bind

himself to compose for the society whenever called upon, he withdrew his score; and the society 18 years later was proud to elect him an honorary member. The fame of his Italian operas procured him an order to compose one for the imperial opera house in Vienna. *La vera costanza* was written and accepted. Haydn had studied the capacities of the singers carefully, and adapted his parts with great skill to their various powers. The theatre was in the hands of the same Italians who had before succeeded in preventing the performance of Mozart's *La finta semplice*, and it was enough to array them against Haydn that he was a German. The one means in their power to kill the opera was to make an entire change in the distribution of the parts, and this they did. Saying, "I know what and for whom I wrote," Haydn took his score and returned to Eisenstadt. During the building of the new château at Eszterházy, the accommodations were so limited that the prince took with him of his orchestra but a few virtuosos, who were obliged to leave their families at Eisenstadt. Six months passed, and the musicians, full of impatience to return, were astonished and despairing to learn that Esterházy intended to prolong his stay two months. They came to Haydn praying him to find some means of changing the prince's determination. To have sent in a petition would only have brought upon him and them the laughter of their employer. Haydn composed a sextet, giving the first violin to the virtuoso Tomasini, whose playing would be sure to hold the prince until the close. At the performance one player after another ceased, blew out his candle, took his music and instrument, and silently left the room, until at length Tomasini alone remained, and he only to finish his part, when like the rest he put out his light and withdrew. "If they all go away, we must leave too," said Esterházy. The performers had waited in an anteroom, and as the prince came through he said laughing: "Haydn, I understand it; the gentlemen may all leave tomorrow." The sextet was afterward developed into a symphony. In 1780 the philharmonic society of Modena sent Haydn a diploma as honorary member. In 1785 he received an order from Cadiz in Spain to compose a series of seven adagios for orchestra, to be played in the principal church at the annual festival in commemoration of the crucifixion. To these seven were afterward adapted words founded upon the seven phrases spoken by Christ upon the cross. As adagios, performed in a church lighted by a single lamp, the priests prostrate before the altar, and the multitude kneeling in silence, this music is, as Haydn himself declared, among the most successful of his compositions. Prince Nicholas Esterházy died Sept. 28, 1790. His son and successor Paul Anthony, not having the taste of his father, dismissed the orchestra, retaining Haydn nominally as his chapelmaster. The composer was now free from all labor but that of composition, had a

handsome income secured to him, and, having made Vienna his residence, occupied himself in laying plans for future works on a grander scale than any hitherto attempted. Thus only could he compete with the young Mozart, whom he loved as a son, but whose genius was a spur to the veteran. A few weeks after the death of Esterházy a stranger entered the room of Haydn. "I am Salomon, of London," said he, "and come to take you thither; tomorrow we will strike a bargain." Salomon was a native of Bonn, but left that city early in life to enter the service of Prince Henry of Prussia, and in 1783 emigrated to London. He had repeatedly urged Haydn by letter in previous years to visit that city, and Prince Esterházy was ready to give the necessary leave of absence; but Haydn was unable to make up his mind to accept the invitation. Gallini, the undertaker of the great professional concerts in Hanover square, was with Salomon upon the continent at this time engaging singers and virtuosos for the succeeding season. Salomon was already at Bonn on his way back to London when he learned the death of Esterházy, and immediately started for Vienna to engage Haydn. The composer hesitated long, but an offer of 3,000 florins for an Italian opera, and 100 florins for every new work which he should compose and direct in a series of 20 concerts, at length overcame his scruples, and on Dec. 15, 1790, he left Vienna. The musical world of London received him with the highest degree of enthusiasm, which increased with each new work that he produced. Soon after the concerts began, a quarrel broke out between Gallini and Salomon on the one part, and the other directors of the concerts on the other, which resulted in driving the two from Hanover square to the Haymarket theatre. Haydn, having made his contract with Gallini, remained faithful to him notwithstanding the offer of a large sum from the other party. The public followed Haydn to the Haymarket, and the enterprise of Gallini and Salomon was successful. Haydn's first stay in London lasted 18 months. The principal works produced were: *Orfeo* (opera seria), 9 symphonies, a symphony concertante, "The Storm," a grand chorus with orchestra, 6 quartets, 11 sonatas, several beautiful songs and canzonets, and the arrangements to more than 100 Scotch songs. The *Orfeo* was not given, because Gallini's license did not include operatic performances. In the summer of 1792 Haydn returned to Vienna, with a handsome sum saved from his earnings, and the fame of being (for Mozart was now dead) the greatest of living composers. On Jan. 19, 1794, he left Vienna for a second visit to London, where he remained a year and a half. His principal works were three symphonies, a large number of songs and airs, both with pianoforte and orchestral accompaniment, the ten commandments composed as canons, 24 minuets and German dances, 6 contra dances, 3 sonatas, an overture, ballads,

&c. George III. and his queen endeavored to persuade him to remain in England; the university of Oxford created him doctor of music. All classes vied in testifying their admiration of his genius. His fame preceded him to Vienna, and soon after his return in 1795 he gave a concert, which was crowded to excess, wherein he produced his three new symphonies, and in which the young Beethoven appeared both as composer and virtuoso, and played his own first pianoforte concerto. Haydn was now in Vienna what he had been in London, the unrivalled master. He had brought with him from London an English text for an oratorio, prepared by Linley, from Milton's "Paradise Lost," entitled "The Creation." Not venturing to compose so grand a work to an English text, he placed it in the hands of Baron van Swieten, who translated and arranged it in its present form. Twelve persons of the highest nobility subscribed to the amount of 500 ducats, which they offered him for a composition of the new text. Haydn accepted the proposition, and in the 68th year of his age he completed this magnificent work. It was first produced March 19, 1799. Its great success led Van Swieten to prepare another text from Thomson's "Seasons," which was composed within the next two years, and first produced at Vienna, under the title of *Die Jahreszeiten* ("The Seasons"), April 24, 1801. This labor had been too great for him, and the barren, unpoetical text had been a source of great trouble and annoyance. Soon after finishing it he felt a feverish attack in his head, and from that time his strength, both mental and physical, sensibly failed. From this period to his death he spent most of his time in his house and garden, which had become one of the principal attractions to strangers in Vienna. On March 27, 1808, he was once more induced to appear in public. It was at a performance of the "Creation," in the great hall of the university. At the famous passage, "and there was light!" in the first chorus, the audience as usual burst into tumultuous applause. Haydn, waving his hand toward heaven, exclaimed, "It comes from there!" At the end of the first part he felt it necessary from his great weakness to leave the room; and as he was borne out in the great chair in which he had sat, he once more, with tearful eyes, turned to the orchestra, and spread out his hands as if to bless them. It was his farewell to the whole world. On May 10, 1809, early in the morning, a corps of the French army advanced toward the suburb Mariahilf of Vienna, not far from Haydn's house. His servants were engaged in getting him out of bed and dressing him when four cannon reports shook the house and frightened the domestics. "Children," said Haydn, "fear not; where Haydn is, no misfortune can befall you." But he had hardly spoken these brave words when he himself began to tremble violently. He now declined rapidly, and died May 31, in his 78th year.—

Gerber's attempt to catalogue Haydn's works fills over 13 octavo pages of his *Neues Lexikon*, and is far from being complete. Haydn himself in 1805 was unable to give a complete list of his compositions; he could remember but 118 symphonies, yet Gerber had at that time the themes of 140. His compositions in England alone filled 768 leaves (1,536 pages) music folio. The following is an abstract of the list which he made out in 1805 for Prof. Bertuch, "of such as he could remember:" 118 symphonies, 83 quartets, 24 trios, 19 operas, 5 oratorios, 163 compositions for the baryton, 24 concertos for different instruments, 15 masses, 10 pieces of church music, 44 sonatas for pianoforte, with and without accompaniment, 42 German and Italian songs, 39 canons, 13 vocal pieces for three and four voices, 365 Scotch and English songs arranged with accompaniments, 40 *divertimenti* for from three to nine instruments, four fantasias, capriccios, &c. Haydn will for ever fill a large space in musical history, not only for the magnitude, number, originality, and beauty of his compositions, but as being one of the small number who have made eras in the development of the art. He is the great mentor in the department of orchestral and chamber music, the father of the modern quartet and its kindred forms, and of the grand symphony. By this it is not meant that orchestras and small companies of performers on stringed instruments were unknown before his time, but that he, adopting the sonata form as perfected by Emanuel Bach and introducing it into compositions for the orchestra and chamber, laid the foundation for that wonderful development of instrumental music exhibited in his own later compositions and in the works of Mozart, and which reached its climax in the musical "poems" of Beethoven. There are but two names in musical history for which this honor is claimed at the expense of Haydn's fame. The one, San Martini (Sammartini), belonged to the old Italian school, and if any of his instrumental works belong to the new era, they are those of his later days, when Haydn's influence was already everywhere felt. But the fame of Haydn has hardly been seriously claimed for San Martini. Of the other, Boccherini, for whom more serious claims have been urged, it is sufficient to say that when Haydn's quartets were already becoming known and gaining him a reputation, Boccherini was a child of 13 or 14 years; that Haydn was already in the service of Prince Esterházy as chapelmaster when Boccherini's opus I., *Sei sinfonie*, for two violins, alto and cello obbligato (that is, mere quartets) was written; that Boccherini's first work for more than four instruments—a concerto (op. 8) for six instruments obbligati, and six *ad lib.*—was not composed till 1769, before which date at least 18 of Haydn's symphonies and several of his quartets had been printed in Paris. Haydn thought it unfortunate that those circumstances had led him so preponderantly

into the field of instrumental composition, rather than into that of operatic writing. But in this no one who is acquainted with his works at all extensively can doubt he was in error. He was of too happy a temperament to have touched the deep-toned harps of Handel, Gluck, Mozart, and Beethoven. For more than half a century music flowed from his pen in a continuous stream, always new, always attractive, always cheerful, always beautiful, often grand, sometimes reaching the sublime, but never betraying any touches of really tragic sorrow or grief. He was the musical apostle of the beautiful and the happy.—Haydn's biography has been written by Griesinger (1810), Bombet ("Bayle," 1817), Grosser (1826), and Ludwig (1867). **II. Michael**, a German composer, brother of the preceding, born at Rohrau, Sept. 16, 1737, died in Salzburg, Aug. 18, 1808. He was educated in music by Reuter, and rose to eminence as an organist and composer, chiefly in consequence of his close study of the works of Fux, Bach, Handel, and Graun. He was chapelmaster at Grosswardein in Hungary, and occupied the same position in the cathedral of Salzburg, where he also established an excellent school of counterpoint. His works are numerous, and embrace operas, oratorios, masses, symphonies, and many other popular forms of vocal and instrumental composition; but they are little known in consequence of the author's reluctance to have them published during his life. His brother Joseph considered him the best composer of sacred music of the day.

HAYDON, Benjamin Robert, an English painter, born in Plymouth, Jan. 25, 1786, died by his own hand in London, June 22, 1846. Disregarding the wishes of his father that he should adopt his own business, that of a bookseller, he went to London at the age of 18, and became a student in the school of the royal academy. He was an enthusiast in the pursuit of what is called "high art," and prosecuted his studies in drawing and anatomy with singular earnestness. His first picture, "Joseph and Mary resting with our Saviour after a Day's Journey on the Road to Egypt," was exhibited in 1807, and immediately purchased by Thomas Hope, the author of "Anastasius." This was followed by "Dentatus," a work which established his reputation, but involved him in a quarrel with the academy, whose hanging committee had placed the picture in a small side room. A fondness for controversy led him to publish several attacks upon the academy, which had only the effect of estranging some of his most valuable friends, of exasperating his own temper, and of cutting him off from what was the chief ambition of his life, the honor of being an academician. From this time forward, notwithstanding the frequent production of eminent works, he had constantly to struggle with pecuniary difficulties. In 1815 he established a school, in opposition to that of the academy, in which the Landseers

and Eastlake were instructed, and about the same time became associated in the conduct of a periodical entitled "Annals of the Fine Arts." Having no tact for either pursuit, he failed in both; and in 1823, two years after his marriage, he was so involved in debt that he became an inmate of the king's bench prison, where he remained two months. Subsequently he painted here one of his most characteristic works, "The Mock Election," representing a scene which took place within the prison walls in July, 1827, and which was purchased by George IV. for 500 guineas. For his "Pharaoh and Moses," painted soon after his release, he obtained an equal sum. Notwithstanding these and similar emoluments, in 1836 he again became a prisoner for debt, but was soon after enabled to compound with his creditors. About this time he lectured on painting with considerable success. Upon the publication by government, in great part through Haydon's own exertions, of proposals for decorating the new houses of parliament with frescoes representing scenes in the history of the nation, he sent to the exhibition in Westminster hall two cartoons, "The Curse" and "Edward the Black Prince." No notice was taken of his performances, and his hope of executing some great public work of art was crushed for ever. To show the world how erroneous had been the decision of the judges, he commenced a series of gigantic pictures, including "Uriel and Satan," "Curtius Leaping into the Gulf," the "Burning of Rome," and the "Banishment of Aristides," the two latter of which, while on exhibition in London, attracted but 133 visitors during the time that Tom Thumb in an adjoining room received 120,000. Under the weight of this neglect and of pecuniary embarrassments his reason gave way, and while engaged on his last great picture, "Alfred and the Trial by Jury," he put an end to his life, having first written in his journal: "Stretch me no longer on this rough world." A post-mortem examination discovered a long-seated disease of the brain, which may account for much of his eccentricity. His family were provided for by a public subscription. Haydon's autobiography, edited by Tom Taylor in 1853 (2d ed., 3 vols. 8vo), lays bare the character of the man, and explains his unhappy career. His love of art was a passion rather than a principle. An impetuosity of temper, impatience of criticism, and an exaggerated estimate of his own powers and of his mission as the apostle of high art, were continually involving him in disputes. His "Judgment of Solomon," "Christ's Entry into Jerusalem," "Christ Rejected," "Christ's Agony in the Garden," and "Raising of Lazarus," all painted previous to his first imprisonment for debt, and in the maturity of his artistic powers, are among the most favorable specimens of his style. Several of these pictures contain portraits of eminent personages, and the "Christ's Entry into Jerusalem" is now the property of the Catholic

cathedral in Cincinnati. His literary efforts are confined chiefly to his "Lectures on Painting and Design" (2 vols. 8vo, 1844-'6), which are bold and clear expositions of the principles of art as he understood them. He also wrote the article on painting in the "Encyclopædia Britannica," and induced the government to purchase the Elgin marbles.

HAYDUKS, a class of Hungarians who were originally shepherds (Hung. *hajdu*), and from whom patriotic militia organizations subsequently received the name. The gallantry of the Hayduks was signally rewarded by Bocskay, prince of Transylvania and the protector of the rights of the Protestants, who endowed them, Dec. 12, 1605, with privileges of nobility, and assigned to them a district known as the Hayduk towns (*Hajdu-városok*); and they have retained most of those privileges, excepting immunity from taxation, which was withdrawn by the emperor Charles VI. at the beginning of the 18th century. The district is enclosed within the county of Szabolcs, E. of the Theiss, and comprised in 1870 an aggregate population of 59,715, almost all Magyars and Protestants. Besides the capital, Bőszörmény (pop. 19,208), it contains the towns of Dorog (8,216), Hadház (7,024), Nánás (13,198), and Szoboszló (12,269).—Menials of Hungarian officials and magnates having been called hayduks, the name was adopted at German courts for ponderous lacqueys, though these are generally Germans or Swiss, and not Hungarians.

HAYEL, or *Hall*, a city of Arabia, in Nedjed, capital of the sultanate of Shomer, situated in a plain between the mountain ranges Jebel Adja and Jebel Solma, lat. 27° 44' N., lon. 42° 42' E., 240 m. N. E. of Medina; pop. in 1862, about 22,000. The walls, which are 20 ft. high, with bastioned towers and folding gates, surround an area capable of containing a population of 300,000, if its houses were closely packed as in European cities; but there are many large gardens, open spaces, and plantations within their circuit. The palace of the sultan with its pleasure grounds occupies nearly a tenth of the city. It is surrounded by a wall 30 ft. high, with semicircular bastions along its front, and a gateway flanked by high square towers. From the palace itself rises a massive oval tower 70 ft. high. The streets of the city are irregular, and most of the houses, which are generally of brick with flat roofs, are built about central courtyards. The surrounding plain is studded with houses and gardens, the country seats of wealthy citizens or of members of the ruling family. Hayel is the centre of a thriving commerce.

HAYES, Augustus Allen, an American chemist, born in Windsor, Vt., Feb. 28, 1806. He graduated at the military academy in Norwich, Vt., in 1823, and then began the study of chemistry as a profession. In 1825 a laborious research undertaken by him, for the purpose of more accurately determining the proximate composition of various American medicinal

plants, was rewarded, among other results, by the discovery of the organic alkaloid sanguinaria, a compound remarkable for the brilliant colors of its salts, although itself colorless, or nearly so. In 1827, while assistant professor of chemistry in the New Hampshire medical college, he investigated the compounds of chromium; and his paper on this subject was highly praised by Berzelius. Dartmouth college about the same time conferred upon him an honorary degree of M. D. Since 1828 he has resided in Boston or its vicinity, and has devoted his time to chemical investigations, filling also successively the posts of director of an extensive manufactory of colors and chemical products at Roxbury, of consulting chemist or director of some of the most important dyeing, bleaching, gas, iron, and copper-smelting establishments in New England, and of state assayer of Massachusetts. His contributions to science have been numerous and valuable, and may be found chiefly in the "Proceedings" of the American academy and of the Boston society of natural history, in the "American Journal of Science," and in the "Annual of Scientific Discovery." In 1837 he conducted an elaborate investigation upon the economical generation of steam and the relative value of fuels, which in 1838 led to a novel arrangement of steam boilers. To Dr. Hayes belongs also the credit of the application of the oxides of iron in refining pig iron in the puddling furnace, so as to produce without loss a pure malleable iron; and still earlier, the refining of copper was, under his direction, rendered a much shorter and more certain operation, by the introduction of the scales of oxide of copper produced in refining. Among his other important original researches are those in relation to the chemical decomposition of alcohol by chlorine and the formation of chloroform; upon the action of alcohol on the human system, and the demonstration of its invariable oxidation in the system into aldehyde and acetous and acetic acids; on the formation, composition, and specific differences of the varieties of guano; on the existence of a deposit of native iron on the west coast of Africa; and a memoir on the difference in the chemical constitution and action of sea waters, on and below the surface, on soundings, and at the entrances of rivers. This last research forms part of an investigation undertaken under a commission from the United States navy department to examine and report on the subject of copper and copper sheathing as applied in the construction of national vessels, and his report embodies a vast amount of scientific and commercial information. In 1859-'60, while considering the question of supply of water to the city of Charlestown, he found, as his earlier analysis indicated, that the deep water of Mystic pond was far less pure than the surface water. The question of diffusion under a flowing surface came up for study, with the responsibility of accepting or

rejecting the source of supply. He had proved that a copper strip or wire, passing vertically through two masses of water of slightly unlike composition, would become polarized, and exhibit electrolytic action. This mode of testing the exact limits of the impure water was applied under his direction, and it was shown that a compound affording sulphur when decomposed could be detected by its action on the strip to form a black sulphide, and the limits of the existence of this compound were read on the surface of the strip of copper, or silvered copper. A large number of observations on this and other masses of water have proved the high practical value of the application, and demonstrated the presence of a stream of naturally pure water, nearly 20 ft. deep, flowing over impure water without contamination. After the outbreak of the civil war, Dr. Hayes called public attention to the uncertainty of the foreign supply of saltpetre, and the necessity of domestic production. His efforts resulted in the manufacture of the supply for the navy from caustic potash and nitrate of soda, by a novel process, the product being of great purity. After spending two years in Europe, to restore his impaired health, studying various phenomena of chemical geology, he returned to the United States, and for the last few years has withdrawn from active life.

HAYES, Isaac Israel, an American explorer, born in Chester co., Pa., March 5, 1832. He was educated in Philadelphia, graduated M. D. at the university of Pennsylvania in April, 1853, and in May was appointed surgeon of the second Grinnell expedition to the Arctic ocean, under command of Dr. Kane, which he accompanied, returning with it in 1855. Some reminiscences of this expedition are given in his "Arctic Boat Journey" (Boston, 1860). He was convinced that there was an open sea around the north pole, and presented his views to the American geographical and statistical society in December, 1857, and during the ensuing winter in lectures on arctic explorations delivered in different parts of the country, especially at the Smithsonian institution in Washington. Subscriptions in aid of an exploring expedition were collected by scientific and other societies in America and Europe, and with this aid he was enabled to fit out the schooner *United States*, of 133 tons, in which he sailed from Boston, July 9, 1860, with a company of 14 persons besides himself. He reached Upernavik, Greenland, Aug. 12, entered Melville bay on the 23d, and, after being twice driven back by the violence of the wind and floating floes of ice, anchored in Port Foulke on the W. coast of Greenland, in lat. 78° 17', Sept. 9. He explored the glacier system of Greenland, and after wintering in Port Foulke set out April 4, 1861, upon a boat and sledge journey across and up the sound. The party of 12 men and 14 dogs found it impracticable to drag the boat over the hummocks of ice, and sending it back, Dr. Hayes

pressed onward with three companions and two dog sledges. They reached the W. coast of the sound May 10, and travelled north until the 18th. Their provisions being exhausted, they were obliged to return, having reached land in lat. 81° 37' N., beyond which they saw open water. The schooner was broken out of the ice July 10, and returned to Boston Oct. 23. In this expedition Dr. Hayes discovered a new sound or channel opening westward from the centre of Smith sound. He found the portion of Kennedy channel which Morton had reported to be open in June, 1854, frozen over May 23, 1861, and the W. coast of the channel heaped with great masses of ice. Before his return home civil war had begun, during which he served as a surgeon in the U. S. army. He published an account of the expedition under the title of "The Open Polar Sea" (Boston, 1867), and received for his discoveries a gold medal from the royal geographical society of London, and another in 1868 from the geographical society of Paris. In 1869 he sailed in the steamer *Panther* in company with the artist William Bradford, exploring the southern coasts of Greenland, and published "The Land of Desolation" (New York, 1872). He has also published "Cast away in the Cold," a story (Boston, 1868). He is now (1874) preparing a history of maritime discovery, and still entertains the project of reaching the north pole by way of Smith sound.

HAYLEY, William, an English author, born in Chichester in 1745, died in Felpham, Nov. 20, 1820. He was educated at Eton and Cambridge, and studied law, but being rich devoted himself to literature. In 1792 he made the acquaintance of Cowper, whose life he afterward wrote (1802). His "Triumphs of Temper," a poem in six cantos (1781), was perhaps the most popular of his poetical works. Among his other writings are an "Essay on Painting" (1778), "Essay on History" (1781), "Essay on Old Maids" (1785), and the "Life and Poetical Works of Milton" (1794).

HAYM, Rudolf, a German author, born at Grünberg, Silesia, Oct. 5, 1821. After having studied in Halle and Berlin, he became a teacher; but the Prussian government refusing to license him as a professor, he turned his attention to journalism and politics, was in 1848 elected to the Frankfort parliament, and published *Die deutsche Nationalversammlung* (3 vols., Berlin, 1848-50). In 1850 he edited the *Constitutionelle Zeitung* in Berlin; but being expelled from that city for having given umbrage to the authorities, he went to Halle, where he obtained a diploma, and in 1851 began to lecture on philosophy and modern German literature, and eventually obtained a professorship. He edited the *Preussische Jahrbücher* from 1858 to 1864, wrote for Ersch and Gruber's cyclopaedia, and has published *Wilhelm von Humboldt* (Berlin, 1856), *Hegel und seine Zeit* (1857), *Arthur Schopenhauer* (1864), and *Die Romantische Schule* (1870).

HAYNAU, Julius Jakob von, an Austrian soldier, born in Cassel, Oct. 14, 1786, died in Vienna, March 14, 1853. He was an illegitimate son of the elector William I. of Hesse-Cassel, who while stationed with his regiment in the town of Haynau, Prussian Silesia, formed an illicit connection with an apothecary's daughter named Rebekka Ritter, who after a morganatic marriage with him assumed the name of Frau von Lindenheim. Two daughters and four sons resulted from this marriage, who adopted the name of their mother's birthplace. The eldest son, Wilhelm (1779-1856), became known by the unpopular part which he took in the affairs of Hesse-Cassel in 1850; the second, Friedrich, was minister of war of the elector from 1853 to 1855; the third, Ludwig, died in Heidelberg in 1843; and the fourth, the subject of this notice, entered the Austrian service in 1801 as lieutenant, was wounded and captured in the campaign of 1805 near Nördlingen, was in 1813 and 1814 with the army in Italy, and in 1815 on the upper Rhine. Having been promoted to the rank of major general in 1835, he became military commander of Gratz in 1844, and of Temesvár in 1847. Radetzky appointed him commander of Verona in 1848. In the night of July 24-25 he despatched, upon his own responsibility, a number of soldiers to Somma Campagna, and secured by this measure the victory of Custoza. Afterward he displayed his skill at the siege of Peschiera. He became notorious for his rigorous measures at Ferrara, Bergamo, and other places; and his ruthless energy in quelling the insurrection of Brescia (March and April, 1849) spread terror among the Italian population. He subsequently took part in the siege of Venice, and on May 30 he was invited to assume the supreme command of the Austrian army in Hungary. He defeated the Hungarians near Raab and elsewhere, and, protected in the flank and rear by the Russian forces, he rapidly advanced toward Szegedin, crossed the Theiss, and routed the Hungarians at Szőreg (Aug. 5) and near Temesvár (Aug. 9), by which victory he rescued that fortress and virtually terminated the war. The emperor of Austria rewarded him with the governorship of Hungary, and gave him extensive estates. The execution of the thirteen Hungarian commanders at Arad, as well as of Louis Batthyányi and other patriots at Pesth, took place under his command. His intractable and haughty temper, which on many occasions had brought him into collision with his superiors, at length caused him to be dismissed from the public service, July 6, 1850. He travelled in England, where, for his cruelty toward the Italians and Hungarians, and especially the ill treatment to which female political prisoners were said to have been subjected under his orders, he was assaulted by the draymen of Barclay's brewery in London, on his visit to that establishment in September, 1850, in such a violent manner that he barely escaped with his life. Hostile demonstrations were also

made against him in Brussels and Hanover. His name was more identified with Austrian oppression in Hungary and Italy than that of any other servant of the house of Hapsburg; but Baron Schönhals in his biography of his comrade, which appeared in Gratz in 1853, tried to exonerate him from the charge of intentional cruelty, asserting that he acted only in obedience to the orders of his masters.

HAYNE, Isaac, an American revolutionary officer, born in South Carolina, Sept. 23, 1745, executed in Charleston, S. C., Aug. 4, 1781. In 1780 he was a senator in the state legislature. On the invasion of the state by the British, he served in a cavalry regiment which kept the field during the final siege of Charleston. Being included in the capitulation of that place, he was paroled on condition that he should not again serve against the British while they held possession. When in 1781 the fortunes of the British began rapidly to decline, he and all others in his situation were required to join the British standard as subjects. His wife and several of his children lay at the point of death from smallpox, but his expostulations were unheard, and he went to the city, after obtaining a written pledge from the military commandant of his district that he should be allowed to return. This pledge was ignored in Charleston, and he was told that he must either become a British subject or go to prison. He subscribed a declaration of allegiance to the royal government, but only under protest against the advantage taken of him at such a moment. Thus enabled to return to his family, he maintained his pledge of neutrality. But when, by the continued success of the Americans, the British were driven from all quarters, and nothing remained to them but Charleston, they resolved to require military service of all who had given their parole. Hayne then went to the American camp, and was commissioned by the governor as colonel of a militia regiment. In July, 1781, he made an incursion to the Quarter House, a precinct within five miles of Charleston, and captured Gen. Williamson, who had gone over to the British. It was feared that Williamson would be hanged as a traitor, and the British commandant at Charleston ordered out his entire force in pursuit. Hayne's party was surprised and scattered, and he himself captured. He was taken to Charleston, and after a brief examination by a board of officers, without any trial, and no witnesses being examined, he was condemned to be hanged by the joint orders of Lord Rawdon and Lieut. Col. Balfour. He protested against this summary process, which was illegal, whether he was regarded as a British subject or as a captive who had broken his parole. The citizens and ladies of Charleston united in petitioning for his pardon; but Rawdon and Balfour were inexorable. A respite of 48 hours only was allowed him in which to take leave of his children, at the end of which period he was hanged. This vindictive measure was

discussed with great ability in the British parliament, and while both Rawdon and Balfour justified it, each was solicitous to attribute it to the agency of the other. Lord Rawdon (earl of Moira) published a justification of his conduct, which was analyzed and criticised by Robert Y. Hayne in the "Southern Review" for February, 1828.

HAYNE, Paul Hamilton, an American poet, born in Charleston, S. C., Jan. 1, 1831. He was educated in Charleston, and became a frequent contributor to the "Southern Literary Messenger" and other periodicals. He was for a time editor of the Charleston "Literary Gazette," was connected with the Charleston "Evening News," and was from its beginning (1857) a principal editor of "Russell's Magazine," published in Charleston. He published a volume of poems in Boston in 1854, and another in New York in 1857. These collections consist chiefly of brief poems, sonnets, and lyrics, "The Temptation of Venus, a Monkish Legend," being the longest. A third volume, entitled "Avolio, and other Poems," was published in 1859. Since then he has been a frequent contributor to periodicals, mainly of short poems. In 1873 he edited the poems of Henry Timrod, and in the same year published in Philadelphia a fourth volume of his poems under the title of "Legends and Lyrics." Since the close of the civil war he has resided in Georgia, near Augusta.

HAYNE, Robert Young, an American statesman, born in St. Paul's parish, Colleton district, S. C., Nov. 10, 1791, died in Asheville, N. C., in September, 1840. He was educated in Charleston, and was admitted to the bar before he was 21 years old. At the beginning of the war of 1812 he served in the 3d regiment of South Carolina troops, and then resumed practice in Charleston. In 1814 he was chosen a member of the state legislature, and after serving two terms he was elected speaker of the house, and then attorney general of the state. In 1823 he was chosen a senator of the United States. In the debates on the question of protection to American manufactures Mr. Hayne took a leading part, and in every stage of the discussion he was an uncompromising opponent of the protective system. When the tariff bill of 1824 came before the senate, he made in opposition to it an elaborate and powerful speech, in which for the first time the ground was taken that congress had not the constitutional right to impose duties on imports for the purpose of protecting domestic manufactures. He was equally strenuous in his opposition to the tariff of 1828, which roused in South Carolina the spirit of resistance that came to a crisis in 1832. In that year Mr. Clay proposed a resolution in the senate declaring the expediency of repealing forthwith the duties on all imported articles which did not come into competition with domestic manufactures. Mr. Hayne denounced this proposition, and submitted an

amendment to the effect that all the existing duties should be so reduced as simply to afford the revenues necessary to defray the actual expenses of the government. He supported this amendment in one of his ablest speeches, but it was rejected, and the principles of Mr. Clay's resolution were embodied in a bill which passed both houses and received the sanction of the president. Mr. Hayne on this occasion was the first to declare and defend in congress the right of a state, under the federal compact, to arrest the operation of a law which she considered unconstitutional. This doctrine led to the celebrated debate between Mr. Webster and himself. In consequence of the passing of the tariff bill the legislature of South Carolina called a state convention, which met at Columbia, Nov. 24, 1832, and adopted an ordinance of nullification. In the following December Mr. Hayne was elected governor of the state, while Mr. Calhoun, resigning the vice presidency of the United States, succeeded to his place in the senate. On Dec. 10 President Jackson issued his proclamation denouncing the nullification acts of South Carolina. The governor replied with a proclamation of defiance, and South Carolina prepared for armed resistance. But congress receded from its position on the protective question, the tariff was for the time satisfactorily modified, and South Carolina in another convention, of which Gov. Hayne was president, repealed her ordinance of nullification. In December, 1834, he retired from the office of governor, and was soon after elected mayor of Charleston. He was attending a railroad convention at Asheville when he contracted a fever and died.

HAYNES, John, governor of Massachusetts, and afterward of Connecticut, born in Essex, England, died in 1654. He came with Hooker's company to Boston in 1633, and soon after was chosen assistant, and in 1635 governor of Massachusetts. In 1636 he removed to Connecticut, and in 1639 was chosen its first governor, and every alternate year afterward, which was as often as the constitution permitted, till his death. He was one of the five who in 1638-'9 drew up a written constitution for the colony, which was the first ever formed in America, and which embodies the main points of all our subsequent state constitutions, and of the federal constitution.

HAYNES, Lemuel, an American clergyman, born in West Hartford, Conn., July 18, 1753, died in Granville, N. Y., Sept. 28, 1834. His father was black and his mother white. The latter abandoned her offspring, who at the age of five was bound out as a servant in a family at Granville, Mass., where he was educated as one of the children. In 1775 he joined the revolutionary army at Roxbury; in 1776 was a volunteer in the expedition to Ticonderoga; after which he returned to Granville and became a farmer. Between this time and 1780 he studied Latin and Greek, and devoted much attention to theology. In 1780 he received

license as a preacher, and was invited to supply the pulpit of a new church in Granville. Here he remained for five years. In 1785 he was ordained, and, after preaching two years in Torrington, Conn., was called to a parish in Rutland, Vt., where he was settled for 30 years. He afterward preached at Manchester, Vt., about three years; and then at Granville, N. Y., from 1822 till his death. He had great shrewdness, wit, and common sense. One of his sermons, delivered impromptu in reply to Hosea Ballou, on the subject of Universalism, passed through many editions on both sides of the Atlantic. A memoir of him was published by the Rev. Dr. Cooley.

HAYS, a central county of Texas, intersected by San Marcos river and watered by branches of the Colorado; area, 690 sq. m.; pop. in 1870, 4,088, of whom 1,217 were colored. A chain of thickly wooded hills crosses it from N. E. to S. W., and the rest of the surface is generally undulating. Building stone is abundant. The chief productions in 1870 were 92,420 bushels of Indian corn, 7,838 of sweet potatoes, and 1,468 bales of cotton. There were 2,448 horses, 1,863 milch cows, 6,044 other cattle, 1,481 sheep, 3,770 swine, and 2 saw mills. Capital, San Marcos.

HAYS, William Jacob, an American artist, born in New York, Aug. 8, 1830. He studied drawing with John R. Smith in New York, and devoting himself to animal painting, went to the head waters of the Missouri in 1860 to paint the fauna of that region. He has since visited Nova Scotia and travelled extensively through the northern part of the United States, sketching and studying the habits of the native animals. Among his principal works are: "The Herd (bisons) on the Moor" (1861); "The Stampede" (1862); "The Prairie-Dog Village" (1862); "Bison Bull at Bay" (1865); "Bull Moose of Nova Scotia" (1867); "Prairie on Fire" (1869); "Bouquet of Orchids," 86 varieties (1871); "Herd of Caribou in Nova Scotia" (1871); and "Mule Deer" (1872). Mr. Hays has in preparation a work on the "Ruminants of America," to be fully illustrated by himself.

HAYTI, or *Haïti*. **I.** An island of the West Indies, formerly called Hispaniola (Span. *Es-pañola*), and afterward Santo Domingo. It is one of the Greater Antilles, and after Cuba the largest and most beautiful of the West India islands, lying between lat. 17° 36' and 19° 59' N., and lon. 68° 20' and 74° 38' W. Its greatest length E. and W., from Cape Engaño to Cape Tiburon, is 405 m., and its greatest width N. and S., from Cape Isabella to Cape Beata, 165 m.; area, including the islands off the coast, 28,030 sq. m.; pop. about 708,500, three fourths of whom are negroes or mulattoes, and the remainder whites or mestizos. Hayti is 48 m. E. S. E. of Cuba, from which it is separated by the Windward passage, 118 m. E. N. E. of Jamaica, and 76 m. W. N. W. of Porto Rico, from which it is separated by the Mona passage. In the Windward passage, about 40 m.

W. of Cape Tiburon, is the guano island of Navaza. The island of Tortuga or Tortue lies a short distance from the N. W. coast, and that of Gonaive in the southern division of the great gulf, 85 m. wide, formed by the vast peninsulas which stretch W., the one toward Cuba and the other toward Jamaica. Hayti is now occupied by two independent states, the republic of Hayti to the west and the Dominican Republic to the east. The island is of very irregular form, being so deeply indented by bays and inlets as to constitute a coast line of about 1,500 m., presenting numerous excellent harbors. Of the great peninsulas, the southwestern is the most conspicuous, being 150 m. long by 18 to 40 m. wide; the northwestern is about 50 m. long by 30 to 45 m. wide; and that of Samana, to the northeast, is about 40 m. long by 6 to 8 m. wide. The island is intersected W. and E. by three chains of mountains, connected by transverse ridges, and intervening are extensive plains and savannas. The central chain, the principal part of which is the Sierra del Cibao, runs E. S. E. from Cape San Nicolas to Cape Engaño; its culminating point, near the centre of the island, attains an elevation variously estimated from 7,200 to 9,000 ft. Nearly parallel with this chain is the Sierra de Monte Cristo, stretching from near the town of Monte Cristo to Escocesa bay, where it terminates abruptly. Between these two ranges extends the Vega Real or Royal valley, 130 m. long, watered by the Yuna and Gran Yaque rivers, and comprising extensive pasture lands. The third or southern mountain range commences at Cape Tiburon, extends E. through the S. W. peninsula, and terminates at the Rio Neiva, about midway between the cities of Port-au-Prince and Santo Domingo. The secondary chains, running from the main ones toward the sea, divide the country into plains of various figures and extent, which are intersected by still other ridges reaching sometimes to the beach. Besides the Vega Real, there are other extensive plains and valleys, as the *llanos* or flats of the southeast, also a rich pasture district 80 m. in length, and the plain of Les Cayes at the W. end of the island. The latter has been greatly extended by the formation of a kind of rock consisting of comminuted shells and coral, incrustated with calcareous cement, resembling travertine, a species of rock in process of formation throughout the whole of the West India islands; fragments of pottery and other human works have been found in it at a depth of 20 ft. The proximity of the mountains to the N. coast prevents the formation of any considerable rivers, and hence the principal streams have their courses either in a W., S., or E. direction. The Artibonite flows S. E. and N. W., and the Gran Yaque N. W.; the Yuna flows S. E.; and the Neiva, Nisao, and Ozama flow S. They are all obstructed by sand bars, and few of them are navigable even for short distances. The Ozama, however, admits vessels of any size into the harbor, and for 3 m. up is about four

fathoms deep. Lakes are numerous; those of Enriquillo and Azua are salt; the former, in the valley of the Neiva, is 20 m. long by 8 m. broad, and the latter half that size. S. of these lies the fresh-water lake of Icotea or Limon, about the size of Azua. Near the mouth of the Yuna are extensive salt marshes known by the name of Gran Estero. Mineral springs exist in various parts; in the east are the hot springs of Banica (temperature 112° to 125° F.), Biahama, Jayua, and Pargatal, and in the west the chalybeate spring of Sainte-Rose, the saline of Jean Rabel, and the sulphur of Dalmarie. The minerals found in the island are various, including gold, silver, platinum, mercury, copper, iron, tin, sulphur, manganese, antimony, rock salt, bitumen, jasper, marble, and several kinds of precious stones. The gold mines have been abandoned, and gold washing is only carried on by the poorer classes in the northern streams. Indeed, all the minerals are neglected for want of machinery and capital. On the shores of the bay of Pearls are the remarkable caves of San Lorenzo, similar in character and formation to those of Matanzas in Cuba.—The climate is hot and moist, but generally salubrious; in the north, and especially in the more elevated localities, there is a perpetual spring. The seasons are divided into wet and dry; in some localities years have passed over without a single heavy shower. The rainy season is from April to November in the W., S., and central portions, and embracing the other half of the year in the N. districts. It is only on the southern coasts that hurricanes are common. At Santo Domingo the extremes of temperature are 60° and 95° , with an annual mean of 78.5° ; and at Port-au-Prince the extremes are 63° and 104° , with a mean of 81° . The maximum occurs in August and September, but the summer heats are much tempered by the sea breezes by day, and the *terral* or land breeze during the night. Hayti has on several occasions suffered from earthquakes; the most disastrous on record are those of 1564, 1684, 1691, 1751, 1770, and 1842. By that of 1751 Port-au-Prince was destroyed, and the coast for 60 m. submerged; and by that of 1842 many towns were overturned and thousands of lives lost. Vegetation is of a tropical character, except where elevation has a controlling influence, and for beauty and luxuriance is unsurpassed by any in the world. The mountains are clothed with majestic forests of pine, mahogany, ebony, fustic, satinwood, and lignum vitæ; also the *roble* or oak, the wax palm, divi-divi, and numerous other cabinet woods; while the graceful *palma real* or royal palm flourishes everywhere in the lowlands. The richest of flowering plants abound; and the usual tropical esculents, grains, and fruits, including plantains, bananas, yams, batatas, maize, millet, oranges, pineapples, cherimoyas, sapodillas, with melons, grapes, and tamarinds, grow in all parts of the islands. There is a species of agave, *Fourcroya Cubense*, extremely abun-

dant, from the fibres of which is made almost all the rope used in the country. The western or French section has always been the best cultivated and most valuable part of the island, as it is the most populous. The articles chiefly raised for export are coffee, cotton, cacao, sugar cane, indigo, and tobacco. Some of these are now less and others more extensively produced than in colonial times. In 1789, 76,000,000 lbs. of coffee were exported from the whole island; in 1854-'5 only 50,749,876 lbs. were exported; in 1855-'6 the quantity was 35,497,724 lbs.; and in 1857-'8, 46,699,270 lbs. The sugar cane was first planted here by Pedro de Atienza in 1520; and no country produces it in greater perfection. The other most important exports are guano and other manures, logwood and other dyes, and mahogany and other woods.—The native quadrupeds are small, the largest being the agouti; but the animals introduced from Europe, and now in a wild state, have thriven prodigiously, large numbers of cattle, swine, and dogs roaming freely in the savannas; the cattle of hundreds of owners graze in herds, and are annually collected and counted, and the young branded. Birds are not numerous; still large numbers of pigeons are annually taken and used as food, and ducks and other water fowl frequent the marshy places. Insects abound, many of them venomous, such as scorpions, tarantulas, and centipedes. There are many species of snakes and lizards; the iguana sometimes attains a length of 5 ft., and is then much feared; its flesh is by the natives considered a delicacy. The lakes and rivers contain caymans and alligators; in the surrounding sea whales are frequently taken; manatees or sea cows are numerous; and turtles, lobsters of enormous size, oysters, and crabs abound on the coasts. II. A republic, occupying the W. portion of the island, and divided from the Dominican Republic on the east by an irregular line drawn from the mouth of the river Anses-à-Pitre or Pedernales on the S. coast to that of the river Massacre, which flows into the bay of Manzanillo, on the N. coast. Its territory extends between lat. $17^{\circ} 55'$ and $19^{\circ} 55'$ N., and lon. $71^{\circ} 52'$ and $74^{\circ} 38'$ W., and, including the islands of Tortuga, Gonaïve, &c., contains 10,204 sq. m. It is divided into six departments, and subdivided into arrondissements and communes; the population is about 570,000. The capital and chief port, Port-au-Prince, situated at the head of the great bay, has a population of about 21,000; and the other ports open to foreign commerce are Cape Haytien, Port de la Paix, Gonaïves, Saint-Marc, Miragoane, Jérémie, Aux Cayes, Aquin, and Jacmel. In this portion of the island the mountains, although relatively more numerous, are of less elevation than in the E. portion; and between them are beautiful and fertile plains and valleys, well watered, and yielding spontaneously valuable timber, precious woods, and dyes. Agriculture is imperfectly carried on,

with inadequate implements. In earlier times, when the soil was cultivated by slaves, some of the staples were more abundantly produced. The articles most largely exported are coffee, cotton, cacao, wax, logwood, fustic, and other dyes, mahogany, and tortoise shell. Cotton, though always cultivated extensively here, has been subject to numerous fluctuations; before the revolution 7,200,000 lbs. were annually sent to France alone; in 1858 the total quantity exported was only 463,608 lbs. On the outbreak of the American civil war cultivators were stimulated by the rise in price from 4*d.* to 2*s.* 6*d.* per pound, and the exports increased to 5,000,000 lbs.; and notwithstanding a heavy fall in prices in 1865, the crop in 1866 reached 7,000,000 lbs. The civil war of 1868 again checked the trade, reducing the exports to 2,000,000 lbs.; but an interval of peace brought the exports for 1871-'2 to 4,130,315 lbs. The yield of the most favorable year above recorded is, however, greatly inferior to the capabilities of the country; and this restricted production is due to the disorganized state of society, the system of peasant culture, and the lack of field hands. The coffee yield has been less intermittent than that of cotton; during the last 15 years of the 18th century it averaged 70,000,000 lbs.; from 1850 to 1860 the annual average was 45,000,000 lbs., and in the following decade 60,000,000. All the Haytian coffee is in common designated Santo Domingo; it is of excellent quality, and comparatively cheap; but there is a general prejudice against it, as it is often sent away imperfectly hulled, and even with an addition of sand and gravel to increase the weight. It is mostly sent to France, where large quantities are bought for the army. The coffee exports to Hamburg were 19,303,858 lbs. in 1872, and 9,401,666 lbs. in 1873. The home consumption is estimated at 1,644,000 lbs. annually. Of cacao, which of late years has been much neglected, the produce might with care be augmented indefinitely. The quantities of the principal articles exported in the year ending Sept. 30, 1872, were as follows: coffee, 64,774,861 lbs.; cacao, 3,003,488; cotton, 4,140,315; logwood, 183,600,000; wax, 139,740; mahogany, 608,941; honey, 88,060 gallons; hides, fustic, and other articles unenumerated. Their total value was \$7,504,633. The largest share of the exports in 1871 went to England, \$1,400,000; but it is probable that much of this was for merchandise *in transitu*, the Liverpool packets taking through freight for Havre and other continental ports. The imports from England embrace small quantities of almost every article manufactured in that country, which owes this advantage to its direct steam communication with Hayti. Large quantities of English hardware are taken, and galvanized iron has of late been extensively imported for roofing houses, a precaution rendered necessary by the frequency of disastrous fires. Only the high class of provisions are brought from England, this branch

being monopolized by the United States. Certain kinds of American cotton fabrics now find a good market in Hayti; for, though somewhat dearer than the British, they are found to be more durable. The total value of the imports for the year ending Sept. 30, 1872, was \$6,860,408. The imports from England in 1870, \$3,900,000, were more than one half the total imports into the country; and although they fell to \$2,500,000 in the following year, the same proportion was preserved. The United States sent 40,399 gallons of petroleum to Hayti in 1871, 69,377 in 1872, and 87,421 in 1873. The port movements in 1871-'2 were: 904 vessels entered, tonnage 165,903, and 850 cleared, tonnage 186,985. There being little cargo in Hayti for the United States, it is advantageous to ship coffee and cotton for England *via* New York, there to be transhipped. Vessels under 50 tons burden, not being subject to tonnage dues, do not appear on official returns. Two steamers from New York make about 18 trips annually to the island. The internal carrying trade is almost exclusively carried on by horses and mules.—Owing to protracted civil wars, the finances are in extreme disorder, and it is impossible to obtain accurate statements thereof. The revenue in 1870 was estimated at 40,000,000 of *gourdes*, or \$2,500,000, and the expenditure at double that amount. There is a large floating debt, arising from the accumulation of the paper money successively emitted by several governments, especially from 1853 to 1855, when the annual emission was about 4,500,000; and this currency, amounting in 1872 to some 800,000,000, has at times been subject to great depreciation; in the year just mentioned it fluctuated from 165 to 350 per cent., while during the late civil war it was almost valueless. A measure initiated by the government in 1873 to redeem the paper money proved abortive, the rate of exchange having been fixed at 300 per cent., while the commercial value was 250 paper dollars to one of silver. Another scheme for the same purpose, namely, increasing temporarily, first by 10 and afterward by 25 per cent., the import and export duties, already very high, had an evil effect upon commerce. Smuggling became an organized system; only one half of the duties was paid to the government, and the other divided between the merchants and the custom-house officials. Heavy payments lately made to France on account of the public debt, and of the indemnity for losses sustained by French subjects during the revolution, have considerably embarrassed the finances. In 1873 a like compensation of £9,073 was paid to England. The remaining debt to France in 1872 was \$3,863,242, to be paid in 11 annual instalments.—The government is based on the constitution proclaimed on June 14, 1867, by the terms of which the legislative power rests in a national assembly composed of two chambers, the senate and the chamber of deputies, the

latter being elected by direct vote of all male citizens for a term of three years, while the senators are appointed by the deputies for two years. The executive power is vested in a president elected by the people for four years, and who must have completed 35 years of age. A president can be reelected only after a lapse of four years from the expiration of his term of office. Four ministers, of finance and foreign affairs, justice and public instruction, interior, and war, aid him in the administration of the republic. The judicial power rests in a high court of cassation, being the highest tribunal of appeals, with superior courts in the capitals of departments, and subsidiary and primary courts in the *arrondissements* and communes. The laws are founded on the civil code of France. The Roman Catholic is the religion of the people, under the jurisdiction of an archbishop. There are four colleges in Hayti, and each commune has a number of common and grammar schools.—Hayti was discovered by Columbus in December, 1492, and here, at Isabella on the N. shore, was founded the first Spanish colony in the new world. Santo Domingo was founded Aug. 4, 1496. For nearly half a century these settlements received much attention and rose to great prosperity; but as other parts of America were discovered, the population was drawn off, and the natives having been extirpated, the island became almost a waste. In 1585 Admiral Drake seized Santo Domingo city, for which he received a ransom of 25,000 ducats. About 1632 the French took possession of the W. shore, and their numbers (increased in a certain measure by the buccaneers who had established themselves on the island of Tortuga and on the N. W. coast of Hayti) multiplied so rapidly that the Spaniards were unable to cope with or banish them; and by the treaty of Ryswick, Sept. 20, 1697, the western portion of the island was guaranteed to France. Cultivation in Hayti (as the French now called their part of the island) rapidly extended under the new rule; a large proportion of the cotton and sugar consumed not only in France, but in all Europe, came toward the end of the 18th century from Hayti, which by that time had become one of the most valuable possessions in the new world. The boundaries between the two colonies were not fixed till 1777. In the mean time the eastern or Spanish portion made little or no progress. In 1790 the population of the western colony numbered about 500,000, of which number 38,360 were of European origin and 28,370 free people of color, the remainder being negro slaves. The free people of color were mostly mulattoes, and some of them had received a liberal education in France and possessed large estates; still they were excluded from all political privileges, and were not eligible to positions of authority or trust. The great revolution in France was heartily responded to by the whites of the colony, who sent deputies to the national as-

sembly at Paris, and proclaimed the adhesion of the colony to the principles of liberty, equality, and fraternity. The application of these principles, however, it was intended should be confined exclusively to the whites. But the mulattoes demanded their extension to themselves; and this appeal being treated with contempt and indignation, they resolved to resort to arms. Accordingly some 300 of them rose in insurrection in October, 1790, under one Vincent Ogé, who had been educated in France; but he was defeated, captured, and with his brother broken on the wheel, and 21 of his followers were hanged. Much indignation was expressed in Paris against the colonists, and by the influence of the society of *les amis des noirs*, the national assembly, May 15, 1791, passed a decree declaring that the people of color born of free parents were entitled to all the privileges of French citizens. This decree did not touch slavery or meddle with the slaves, but it excited to the highest pitch the jealousies and apprehensions of the planters, who forced the governor of the colony to suspend its operation until they could appeal to the home government. The refusal of their rights caused much commotion among the mulattoes, and civil war again appeared inevitable, when a third party, little considered by either of the others, unexpectedly interfered. The slaves on the plantations rose in insurrection, Aug. 23, 1791. The whites in alarm consented (Sept. 11) to admit the mulattoes to the civil rights granted them by law, and for a time there seemed some prospect of the restoration of peace. But on Sept. 24 the national assembly at Paris, moved by the remonstrances which had been received from the white colonists, repealed the decree of May 15. The mulattoes now flew to arms, and the civil war continued with increased ferocity on all sides for several years. Commissioners were repeatedly sent from France, but could effect nothing. The whites themselves were divided into hostile factions, royalist and republican, the French part of the island was invaded by the Spaniards and by the English, and the insurgent blacks and mulattoes under able chiefs held strong positions in the mountains and defied all efforts to subdue them. The French commissioners, involved in difficulties on every hand, at length decided to conciliate the blacks, and in August, 1793, proclaimed universal freedom, in apprehension of an English invasion, which took place in the following month. In February, 1794, the national convention at Paris confirmed this act of the commissioners, and formally guaranteed the freedom of all the inhabitants of the French colony. Meantime the English conquered the whole western coast of the island, took the capital, Port-au-Prince, and besieged the governor, Gen. Laveaux, in Port de la Paix, the last stronghold of the French, who were reduced to extremities by famine and disease. At this juncture the blacks, led by Toussaint l'Ouverture, relying on the procla-

mation of emancipation, came to the aid of the French governor. The siege of Port de la Paix was raised, the Spaniards were driven back, and after a long contest, during which Toussaint was appointed by the French authorities commander-in-chief of the army, the English in 1797 were expelled from the island, the whole of which, by the treaty with Spain concluded at Basel, July 22, 1795, now belonged to France. Under the energetic administration of Toussaint l'Ouverture, peace was restored, commerce and agriculture revived, the whites were protected and their estates restored to them, and a constitution for the colony was adopted, acknowledging the authority of France, but making no distinction between the citizens on account of race or color. In 1801, however, Napoleon Bonaparte, then first consul, resolved to restore slavery in Santo Domingo; the French legislature at Paris decreed its restoration; and an expedition under Gen. Leclerc was sent to enforce the decree. The army landed at Samana at the end of January, 1802, the campaign was commenced, and fought with various success until May 1, when a treaty of peace was concluded. Notwithstanding this treaty, Toussaint was treacherously seized at midnight, and conveyed to France, where he died April 27, 1803. Indignant at the capture of their leader, the negroes immediately renewed hostilities under Dessalines, who prosecuted the war with vigor and success; and the yellow fever, having broken out in the French army, became a more fearful and fatal antagonist than the marshalled negroes. In the midst of this calamity Leclerc died, and was succeeded in command by Gen. Rochambeau. The first act of this general was the renewal of the armistice, but it proved of no advantage to him; the blacks continued to receive reinforcements, the fever raged violently, and to add to his embarrassment, an English fleet appeared off the coast. When the period for which the armistice had been proclaimed expired, his army was reduced to a mere handful of men, powerless for either offence or defence, and was soon after driven into Cape Haytien, where on Nov. 30, 1803, the French general capitulated to the commander of the English squadron. On Jan. 1, 1804, the Haytians formally asserted their independence; and Dessalines, who had conducted the war to its close, was appointed governor for life. Not content, however, with the simple title allotted to his station, and in imitation of Bonaparte, who had six months before grasped the imperial sceptre of France, Dessalines assumed (Oct. 8, 1804) the title of Jean Jacques I., emperor of Hayti; but his reign was troublous and brief, and terminated in a military conspiracy on Oct. 17, 1806, he himself being assassinated on the same day. Hayti was now divided among several chieftains, the principal of whom were Henri Christophe in the northwest and Pétion in the southwest. The eastern part of the island was repossessed by Spain. Chris-

tophe was appointed chief magistrate for life; but in 1811, having become dissatisfied with his present honors, he changed his title to that of king, calling himself Henri I., and had the kingly office made hereditary in his family. Pétion continued to act as president of the southwest till March, 1818, when he died, universally lamented by his people. On the other hand, the despotic Christophe by his arbitrary acts provoked the vengeance of his subjects, and shot himself during a revolt against his authority in October, 1820. Boyer, who succeeded Pétion in power, now united all the governments of the west, and ruled over the whole Haytian territory. The retrocession of the eastern colony had been made at the instigation of the English government; but it was never fully acquiesced in by the inhabitants, and its possession by Spain had since been rather nominal than real. The proximity of a free republic, separated only by a conventional line, was also fraught with danger, and encouragement to revolt was not otherwise wanting. At length the people determined to be as free and independent as their neighbors, and on Nov. 30, 1821, threw off the Spanish yoke and declared their country a republic. Profiting by the dissensions that followed, Boyer, the Haytian president, now invaded the disturbed country, and in 1822 united the whole island under his government. France acknowledged the independence of its former colony in 1825, on the condition that Hayti should pay 150,000,000 (subsequently reduced to 90,000,000) francs, as an indemnity for the losses of the French colonists during the revolution. Boyer retained the presidency till 1842, when a revolution broke out against his power and compelled him to flee; and soon after the inhabitants of the east, under the leadership of Juan Pablo Duarte, rose against the Haytians, overpowered them, and in February, 1844, formed themselves into an independent state under the style of the Dominican Republic. In the following years the supreme power in Hayti was successively held by Hérard, Guerrier, Pierrot, and Riché till 1847, when Gen. Faustin Soulouque was elected president. He renewed the attempt to subjugate the eastern republic; but he, at the head of an army 5,000 strong, was opposed by Santana with only 400 men, and signally defeated at Las Carreras on the river Ocoa in April, 1849. Soulouque was a member of the secret order of Vaudoux; he was superstitious and illiterate, but possessed of great ambition. On Aug. 26, 1849, aided by the blacks, he assumed the title of emperor as Faustin I., and caused the constitution to be altered to meet the changed circumstances of affairs; and to consolidate his power, he surrounded himself by a court composed of princes of the blood, dukes, counts, barons, &c., and established two orders of knighthood, that of St. Faustin and the legion of honor. He was crowned with great pomp in 1850. His policy, which had become des-

potic; his habits, too expensive for the condition of the country; and above all his impudent robberies of the public funds, gave rise to a sullen discontent, which soon pervaded the whole country. On Dec. 22, 1858, he was deposed; and on the following day a republic was proclaimed under Fabre Geffrard. On Jan. 10, 1859, Soulouque made an attempt to regain the crown, but was compelled to surrender to Geffrard, and on the 15th he set sail for Jamaica. In September a band of conspirators attempted to assassinate Geffrard, but succeeded only in murdering his daughter. The assassins were apprehended and executed. A series of impolitic acts soon rendered the new administration as unpopular and odious as had been that of Soulouque. On the night of Feb. 22, 1867, the citizens of Port-au-Prince rose in insurrection; and Geffrard, foreseeing that a change was contemplated and imminent, tendered his abdication and fled to Jamaica, having previously secured a large amount of public money. A triumvirate was now appointed, composed of Nissage-Saget, Chevalier, and Salmave; but in June the last named was elevated to the presidency, and the present constitution at once promulgated. A new insurrection broke out against Salmave in 1868. After having been several times defeated by the revolutionists, he fortified himself in Port-au-Prince; but his fleet having been captured, the town bombarded, and the grand palace completely destroyed, he was compelled to seek safety in flight, and yielding to the persuasions of the British consul, he endeavored to escape to Dominican territory. He was, however, captured by Cabral, and on Jan. 11, 1870, surrendered to Nissage-Saget, who had meantime been called to the capital by the victorious Gen. Brice, by whom the city had been bombarded. Salmave was tried by court martial, on charges of bloodshed and treason, sentenced to death, and shot on the steps of his ruined palace. On May 29 Nissage-Saget was named president of the republic of Hayti; and he has now (April, 1874), in spite of numerous attempts to overthrow his government, almost completed his term of office, a good fortune which few of his predecessors enjoyed.

HAYWARD, Abraham, an English writer and translator, born about 1800. He is a lawyer, holding the rank of queen's counsel. His works are: "Statutes founded on the Common Law Reports" (London, 1832); a prose translation of Goethe's "Faust" (1833-'47); translation of Savigny's "Vocation of our Age for Legislation and Jurisprudence" (1839); "Law regarding Marriage with the Sister of a Deceased Wife" (1846); "Juridical Tracts" (1856); "Biographical and Critical Essays" (2 vols., 1858-'73); "Autobiography, Letters, and Remains of Mrs. Piozzi" (2 vols., 1861); "Diaries of a Lady of Quality from 1797 to 1844" (1864); and "More about Junius" (1868).

HAYWOOD. I. A W. county of North Carolina, bordering on Tennessee, and watered by

Big Pigeon river; area, about 550 sq. m.; pop. in 1870, 7,921, of whom 515 were colored. It lies between the Blue Ridge and Iron mountain, and has a rough surface with fertile river bottoms. The chief productions in 1870 were 40,734 bushels of wheat, 206,998 of Indian corn, 26,879 of oats, 11,126 of potatoes, 18,692 lbs. of tobacco, 15,299 of wool, and 76,463 of butter. There were 1,357 horses, 2,539 milch cows, 4,106 other cattle, 7,844 sheep, and 11,234 swine. Capital, Waynesville. **II.** A S. W. county of Tennessee, drained by the Hatchee and the S. fork of Forked Deer river; area, 600 sq. m.; pop. in 1870, 25,094, of whom 13,832 were colored. It has an even surface, and a fertile, well cultivated soil. The Louisville and Nashville and Great Southern railroad passes through it. The chief productions in 1870 were 38,507 bushels of wheat, 522,921 of Indian corn, 31,037 of sweet potatoes, 89,739 lbs. of butter, and 10,510 bales of cotton. There were 2,172 horses, 1,889 mules and asses, 7,706 cattle, 5,206 sheep, and 20,514 swine; 4 manufactories of carriages, 2 of tin, copper, and sheet-iron ware, and 6 saw mills. Capital, Brownsville.

HAZARD, Rowland Gibson, an American manufacturer and author, born in South Kingston, R. I., Oct. 9, 1801. He has been engaged from his youth in mercantile and manufacturing pursuits, in which he has accumulated a large fortune. While in New Orleans in 1841-'2, with great effort, and under repeated threats of being lynched, he obtained the release of large numbers of free negroes who belonged to ships from the north, and who had been placed in the chain gang. He was a member of the Rhode Island house of representatives in 1851-'2 and 1854-'5, and was a state senator in 1866-'7. He has published an "Essay on Language" (1834); "Lectures on the Adaptation of the Universe to the Cultivation of the Mind" (1840); "Lecture on the Causes of the Decline of Political and National Morality" (1841); "Essay on the Philosophical Character of Channing" (1844); "Essays on the Relations of Railroad Corporations to the Public" (1849); "Essay on the Duty of Individuals to Support Science and Literature" (1855); "Essays on the Resources of the United States" (1864); "Freedom of the Mind in Willing" (1864); "Essays on Finance and Hours of Labor" (1868); and "Causation and Freedom in Willing," two letters addressed to John Stuart Mill (1869).

HAZARDVILLE, Conn. See ENFIELD.

HAZEBROUCK, a town of France, in the department of Le Nord, 24 m. W. N. W. of Lille, at the junction of the Calais and Dunkirk railways; pop. in 1866, 9,017. It has several handsome public buildings, among which are the spacious and richly ornamented parish church, built from 1493 to 1520, surmounted by a beautiful spire of open work, 240 ft. high; a fine town house, an old Augustinian convent now occupied by the large linen market, a

communal college, and a normal school. There are manufactures of linen, thread, starch, soap, leather, and salt; breweries, tanneries, dye works, oil mills, and lime kilns.

HAZEL, the common name for shrubs or small trees of the genus *corylus*, which is by some botanists placed with the oak, chestnut, &c., in the order *cupuliferae*, while others make it the type of a small order *corylaceae*, comprising the hazel and the hornbeams. The name of the genus is an ancient one, and is supposed to be from the Greek *κῆρυς*, a helmet, while the word hazel is referred by some to the Anglo-Saxon *hæsel*, bonnet. There are seven recognized species of the genus *corylus*, two of which are natives of North America. These are small, much branched shrubs, rarely over 6 ft. high, and very common along the edges of woods and by roadsides and in thickets. They are among the first plants to open their flowers in spring; the staminate and pistillate flowers are in aments very dissimilar in appearance, and both upon the same plant; the male or staminate flowers are in cylindrical pendulous aments 2 or 3 in. long, and consist of a wedge-shaped scale, beneath which are about eight anthers; being perfectly formed the autumn before, these aments



Hazel Flowers.



Hazel Leaves and Fruit.

are ready to open with the first warm days, and when quite in flower they are tremulous with every breeze and scatter their pollen profusely. The pistillate aments are small, and might be overlooked by a careless observer, as they appear so much like buds. A close inspection will

show a cluster of delicate crimson stigmas projecting from the apex of the bud-like ament; the fertile flowers are very simple, consisting of an ovary with two elongated styles, placed in the axil of a scale and accompanied by two small bracts, which as the fruit matures increase rapidly in size, and ultimately form an envelope or husk which encloses it; the fruit is a one-seeded nut with a bony shell and a large sweet kernel. The most abundant American species is the common or American hazel, *C. Americana*, which has a nut about three fourths of an inch broad, somewhat less in length, and surrounded by a husk longer than itself, but which is open down to the nut; this involucre consists of two leafy bracts, which are thick below, with their margins cut and fringed. This species extends from Canada to Florida and west of the Mississippi. The nuts vary in size and quality, but at the best are inferior to the imported. The beaked hazel, *C. rostrata*, is a smaller bush than the other, and mainly differs from it in the form of the husk, which closely surrounds the nut and is prolonged beyond it into a long bristly beak; its form has been compared to that of a long-necked bottle; the nuts are less pleasant to the taste. This is more common northward and upon mountains southward, and extends to the Pacific coast; a variety of it has even been found near the Amoor river in Asia.—The most important *corylus* is *C. Avellana*, which produces the well known imported filbert. The specific name is said to be from Abellina in Asia, which Pliny supposed to be its native country, but it is found wild in various parts of Europe and Asia, and to a limited extent, in northern Africa. In its natural state the filbert forms a large bush, but by keeping down the suckers which it so abundantly produces it may be made to form a tree 20 or 30 ft. high. The filbert is largely cultivated in England and on the continent. This species has nearly the same general appearance as the American hazel bush, but the fruit is much larger, while the involucre or husk is not usually longer than the nut. It is but little cultivated in this country, and is only now and then seen in gardens, chiefly as a curiosity. With proper care in pruning there seems to be no obstacle to its cultivation here; those who have tried it say that it yields abundantly. In England, where much attention is given to their cultivation, the bushes are kept to the height of about 6 ft., and in their early growth are pruned with a view to produce a great number of lateral branches, as it is upon these that the fruit is borne. There are 30 or 40 named varieties recorded, but not more than half a dozen are in general cultivation. The name filbert, or "full-beard," is given to those with a long husk; those with a short husk are called hazel-nuts, or simply nuts; while those with a short nut and a thick shell are known as cobs. Among the most valued varieties is the Cosford, which has a very long nut with a thin shell. In two of the esteemed

cultivated rarities, the red and the white filbert, the husk is so much prolonged beyond the nut that some botanists have regarded it as a species, *C. tubulosa*; another marked variety is the frizzled nut. It is said that 30 cwt. of nuts have been produced upon a single acre. In England the nuts are preserved and sold in the husk; after being thoroughly dried they are sometimes subjected to the fumes of burning sulphur to prevent moulding; some for the same purpose pack them with salt. Besides the large quantities raised in England, the importation, chiefly of Barcelona nuts, is very large, over 140,000 bushels having been imported in a single year. Those brought to the United States come almost wholly from the south of Europe; a very small quantity of English nuts in the husk are sold by city fruit dealers. The wood of the filbert is very close-grained, and furnishes tough and flexible shoots for making crates, hoops, whip handles, withes, and the like. A variety with dark purple foliage is cultivated as an ornamental shrub. An Asiatic species, *C. columna*, forms a large tree; its nuts are imported into England under the name of Smyrna or Constantinople nuts; they yield an oil valued by painters.

HAZLETON, a borough of Luzerne co., Pennsylvania, on the dividing ridge between the Delaware and Susquehanna rivers, about 2,000 ft. above the sea, and 80 m. N. N. W. of Philadelphia; pop. in 1860, 1,707; in 1870, 4,317; in 1874, about 7,000. It is connected with the seaboard by the Lehigh Valley railroad, and with the west by the Danville, Hazleton, and Wilkesbarre line. It has a very healthful summer climate, and is resorted to during that season by many wealthy families from the seaboard and inland cities. It is the centre of the Hazleton coal field, commanding the trade of that district, and contains the shops of the Hazleton division of the Lehigh Valley railroad, two planing mills, two grist mills, a furniture factory, a foundery, a large hotel, two banks, a daily and two weekly newspapers, three public school buildings, and eight churches.

HAZLITT. **I. William**, an English author, born in Maidstone, April 10, 1778, died in London, Sept. 18, 1830. His father, a Unitarian clergyman, sent him to the Unitarian college at Hackney to be educated for the ministry. But he devoted himself to philosophy and art, and on leaving college determined to become a painter. He painted portraits with tolerable success, but finding he was not likely to reach a high standard, he renounced the art. In 1805 appeared his essay on "The Principles of Human Action," after which he became a regular contributor to newspapers of political articles and theatrical art criticisms, which, with his criticisms on literature and literary men, constitute his chief claim to remembrance. Among his best known works are: "Characters of Shakespeare's Plays" (8vo, London, 1817); "A View of the English Stage" (1818); "Lectures on the English

Poets" (1818); "Lectures on the English Comic Writers" (1819); "Lectures on the Literature of the Elizabethan Age" (1821); "Table Talk" (2 vols. 8vo, 1824); "The Spirit of the Age" (1825), containing sketches of the leading public characters of the day; an essay on the fine arts in the "Encyclopædia Britannica;" and the "Life of Napoleon Bonaparte" (4 vols. 8vo, 1828), dictated by enthusiastic admiration of his subject. In 1836 appeared his "Literary Remains," with a notice of his life by his son, and thoughts on his genius and writings by Sir E. L. Bulwer and Sergeant Talfourd (2 vols. 8vo). Hazlitt's free comments upon living authors made him many enemies. He was married in 1808, and divorced in 1823, and in the succeeding year married a wealthy widow. **II. William**, an English author, son of the preceding, born in Wiltshire, Sept. 26, 1811. He was called to the bar in London in 1844, and appointed registrar of the court of bankruptcy in 1854. He is chiefly known in the world of letters by editions of some of his father's works; an edition of the writings of De Foe (3 vols. 8vo, 1840); translations of Michelet's "Roman Republic," Guizot's "History of the English Revolution" (12mo, 1846) and "History of Civilization" (3 vols. 12mo, 1846), Thierry's "History of the Conquest of England by the Normans" (2 vols. 12mo, 1847), and Huc's "Travels in Tartary, Thibet, and China" (1852); and an edition of Johnson's "Lives of the Poets," with additions, from the earliest period to the close of the last generation (4 vols. 12mo, 1854). In connection with Mr. Roche he has compiled a "Manual of Maritime Warfare" and editions of the bankruptcy acts of 1861 and 1869. **III. William Carew**, an English author, son of the preceding, born Aug. 22, 1834. He entered the Inner Temple in 1859, and was called to the bar in 1861. He has written "The History of the Venetian Republic" (4 vols., 1858-'60); "British Columbia and Vancouver Island" (1858); and "Sophy Laurie," a novel (1865). He has also edited "Old English Jest Books" (3 vols., 1864), "Remains of the Early Popular Poetry of England" (4 vols., 1864-'6), the works of Charles Lamb (4 vols., 1866-'71), "Memoirs of William Hazlitt" (2 vols., 1867), "Bibliography of Old English Literature" (1867), "English Proverbs and Proverbial Phrases" (1869), "Popular Antiquities of Great Britain" (3 vols., 1870), and a new edition of Warton's "History of English Poetry" (4 vols., 1871). In the last named work he was assisted by several eminent antiquaries.

HEAD. **I. Sir George**, an English author, born near Rochester in 1782, died in London, May 2, 1855. He served as commissary in the British army during the war in the Peninsula, and also in Nova Scotia and the Canadas. He published "Forest Scenes and Incidents in the Wilds of North America," "Home Tour," and "Rome, a Tour of Many Days." **II. Sir Francis Bond**, an English author, brother of the pre-

ceding, born near Rochester in 1793. While an officer in the engineers he received from a mining company an invitation to explore the gold and silver mines of South America, between Buenos Ayres and the Andes. He arrived in Buenos Ayres in 1825, and in a short time had completed the work, having crossed the pampas four times and the Andes twice, and ridden more than 6,000 miles, most of the time alone. His "Rough Notes of a Journey across the Pampas" (1826) gives a graphic description of his expedition. In November, 1835, he was appointed lieutenant governor of Upper Canada, and held office during the insurrection of 1837; after which he returned home and published a narrative in which he justified the severe measures he had taken against the insurgents. For his services in suppressing the rebellion he was created a baronet in 1838, and received the thanks of the legislatures of Upper Canada, Nova Scotia, and New Brunswick. In 1867 he was made a privy councillor. His remaining works are: "Bubbles from the Brunnen of Nassau" (1833); "Life of Bruce" (1844); "The Emigrant" (1847); "Stokers and Pokers" and "The Defenceless State of Great Britain" (1850); "A Fagot of French Sticks" (1851); "A Fortnight in Ireland" (1852); "Descriptive Essays" (1856); "The Horse and his Rider" (1860); and "The Royal Engineer" (1870).

HEADLEY, Joel Tyler, an American author, born in Walton, Delaware co., N. Y., Dec. 30, 1814. He graduated at Union college in 1839, studied at Auburn theological seminary, and was pastor for two years at Stockbridge, Mass. Obligated by the failure of his health to abandon his profession, he travelled in Europe in 1842-'3, and after his return published two volumes entitled "Letters from Italy" and "The Alps and the Rhine" (New York, 1845), which were received with favor. In 1846 he published "Napoleon and his Marshals" (2 vols. 12mo) and "Sacred Mountains," and in 1847 "Washington and his Generals" (2 vols.). Among his later publications are lives of Oliver Cromwell, Winfield Scott, Andrew Jackson, and Washington; "Adirondacks, or Life in the Woods" (1849); "The Imperial Guard of Napoleon from Marengo to Waterloo" (1852), founded on a popular French history by E. M. de Saint-Hilaire; a "History of the Second War between England and the United States" (2 vols., 1853); "Sacred Scenes and Characters;" "Life of General Havelock" (1859); "The Great Rebellion, a History of the Civil War in the United States" (2 vols., 1863-'6); "Chaplains and Clergy of the Revolution" (1864); and "Sacred Heroes and Martyrs" (1870). Mr. Headley resides near Newburgh, on the Hudson river. In 1856-'7 he was secretary of state of New York.

HEALY, George Peter Alexander, an American painter, born in Boston, July 15, 1813. He went to Paris in 1836, where he remained several years, alternating his residence there with oc-

casional visits to the United States. He is known for his portraits of Louis Philippe, Marshal Soult, Gen. Cass, Calhoun, Webster, Pierce, Gen. Sherman, O. A. Brownson, W. H. Prescott, H. W. Longfellow, and other prominent persons. His large historical picture of "Webster's Reply to Hayne," which contains 130 portraits, was completed in 1851, and now hangs in Faneuil hall, Boston. At the great Paris exhibition in 1855 he exhibited a series of 13 portraits and a large picture representing Franklin urging the claims of the American colonies before Louis XVI., for which he received a medal of the second class. He resided in Chicago from 1855 to 1867, when he went to Europe, and now (1874) lives in Rome.—His daughter MARY is the author of "Lakeville" (1871), and other successful novels.

HEARD, a W. county of Georgia, bordering on Alabama, and intersected by the Chattahoochee river; area, 286 sq. m.; pop. in 1870, 7,866, of whom 2,648 were colored. The surface is hilly and well wooded with oak, hickory, and pine. Gold, lead, and iron have been found, and the soil is generally rich. The chief productions in 1870 were 22,771 bushels of wheat, 151,435 of Indian corn, 13,406 of sweet potatoes, and 3,508 bales of cotton. There were 637 horses, 744 mules and asses, 1,231 milch cows, 2,282 other cattle, 3,012 sheep, and 6,425 swine. Capital, Franklin.

HEARING. See ACOUSTICS, and EAR.

HEARNE, Samuel, an English explorer, born in London in 1745, died in 1792. In early life he served as a midshipman under Hood, but upon the conclusion of the seven years' war he entered the employment of the Hudson Bay company, and made several journeys into the northern regions of British America in quest of a northwest passage and of mines of the precious metals. In 1770-'71 he descended the Coppermine river about 30 m. to the Arctic ocean. He was promoted for these services, and in 1787 returned finally to England. In 1795 appeared his "Journey from the Prince of Wales's Fort, in Hudson's Bay, to the Northern Ocean; undertaken by order of the Hudson's Bay Company for the Discovery of Copper Mines, a Northwest Passage, &c., in the Years 1769, 1770, 1771, and 1772" (4to, London).

HEARNE, Thomas, an English antiquary and author, born at White Waltham, Berkshire, in 1678, died June 10, 1735. He graduated at Oxford in 1699, and became janitor of the Bodleian library in 1701, and in 1712 second librarian. Three years later he was appointed architypographer of the university and esquire beadle of civil law; but being a strong Jacobite, he was soon compelled to resign his offices. His plodding industry and irritable temper brought upon him the ridicule of many satirists, and Pope described him in the "Dunciad" under the name of "Wormius." Among Hearne's most valuable publications, which number more than 40, and the greater

part of which were printed by subscription at Oxford, are the "Life of Ælfred the Great," from Sir John Spelman's manuscript in the Bodleian library (8vo, 1709); Leland's "Itinerary" (9 vols. 8vo, 1710-'12); and Leland's "Collectanea" (6 vols. 8vo, 1715).

HEART, a hollow muscular organ, the centre of the circulatory apparatus, situated within the cavity of the chest, giving origin to the arteries and receiving the termination of the veins. In the human species it is conical, with its base upward and backward, on the median line, from the fourth to the eighth dorsal vertebra, and its point directed downward, forward, and to the left, reaching nearly to the level of the sixth costal cartilage. In the human subject its length is about 5 in., its breadth about $3\frac{1}{2}$ in., and its average weight a little less than 10 oz. Its size in any particular individual corresponds very nearly with that of the closed fist. In man and all the warm-blooded vertebrate animals the heart is double, that is, it consists of two lateral halves, right and left, separated by an impervious partition; the right half being destined to receive the venous blood returning from the general circulation and send it to the lungs; the left half receiving the arterialized blood from the lungs and sending it into the arterial system, to be distributed throughout the body. The left half is considerably the thicker, more muscular, and more powerful; the impulse required to propel the blood through the general circulation being greater than that needed to carry it through the vessels of the lungs. Each half consists of two cavities communicating with each other, called respectively the "auricle" and the "ventricle." The auricle is the smaller and thinner, receiving the blood directly from the veins, while the ventricle is the larger and stronger, receiving the blood from the auricle and discharging it into the corresponding artery. Between the auricle and ventricle, on each side, is an opening, the "auriculo-ventricular orifice," through which the blood passes from the former to the latter. From the right ventricle originates the pulmonary artery, going to the lungs, and from the left ventricle the aorta, the main trunk of the arterial system. The heart is so placed within the chest that the right auricle and ventricle are situated rather upon its anterior, and the left auricle and ventricle rather upon its posterior portion; so that in a front view the right side of the organ comes most prominently into notice. The great arteries also arise from the base of the heart in such a way that the commencement of the pulmonary artery is in front and a little to the left, that of the aorta rather behind and to the right. Thus the two streams of blood, arterial and venous, in passing through the heart, cross each other in an obliquely spiral direction; the venous blood, which enters the right auricle, passing out by the pulmonary artery on the left, and the arterial blood, which enters by the left auricle, passing out

by the aorta on the right. The structure of the heart, as already intimated, is essentially muscular. Its muscular fibres, which form by far the greater part of its mass, belong to the striped variety, resembling in this respect the fibres of the voluntary muscles. They are dis-

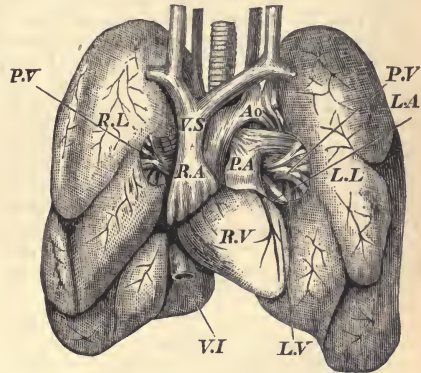


FIG. 1.—The Heart, Great Vessels, and Lungs—Front View.
R.V., right ventricle; L.V., left ventricle; R.A., right auricle; L.A., left auricle; Ao., aorta; P.A., pulmonary artery; P.V., pulmonary veins; R.L., right lung; L.L., left lung; V.S., vena cava superior; V.I., vena cava inferior.

tinguished from the latter by two peculiarities: their smaller size, and the fact that, although generally arranged in a parallel direction, they frequently anastomose with each other, thus forming a kind of muscular network, and no doubt affording mutual points of support at the time of their contraction. The general arrangement of the muscular fibres of the heart is spiral and circular. They originate principally from a strong fibrous ring surrounding the auriculo-ventricular orifices. Thence the fibres destined to form the walls of the auricles pass upward and encircle these cavities with a variety of interlacing bands, some of which pass across the intervening septum and thus connect the two auricles by muscular fibres common to both. The fibres of the anterior portion of the right ventricle also pass obliquely downward across the interventricular septum, and wind spirally round the apex of the left ventricle. The deep-seated fibres of each ventricle are still more strongly spiral and even nearly circular in direction, like the transverse fibres of the intestine, so that when they contract like the fingers of a closed hand, they nearly obliterate the cavity of the ventricles. At their termination they again run upward, and are attached to the auriculo-ventricular



FIG. 2.—Muscular Fibres of the Heart.

ring from which they originated, or, by fleshy columns, to the tendinous chords of the ventricular valves. Besides its muscular tissue, the heart is covered externally by a serous and fibrous membrane, the pericardium, and is lined internally by another serous membrane, the endocardium; the latter of which is continuous with the lining membrane of the blood vessels. At each of the great orifices of the heart are membranous valves, composed of a thin and flexible but strong fibrous tissue, so arranged as to allow the blood to pass freely onward in its course, but to prevent its flowing back in the opposite direction. Those situated at the auriculo-ventricular orifices are the ventricular valves; those at the orifices of the great arteries are the arterial valves. Each set, on the right and left side, has also received a special name corresponding to certain peculiarities of form or position. The right ventricular valve is composed of a broad fibrous

having the form of semilunar bags, with their concavities toward the wall of the artery to which they are attached, and their convexities toward the cavity of the ventricle. Thus when the stream of blood passes from the ventricle into the artery, the valves are flattened against the wall of the vessel, and offer no resistance to its current; but when distended by a backward impulse they fill with blood, and, their edges coming in contact, they close the orifice of the ventricle in this direction. Both sets of arterial valves, from the similarity of their figure, are called semilunar valves; but they are also known as the pulmonary or the aortic valves, according to the particular vessel in which they are situated. They are usually described in connection with the heart; but it is evident from what has been said above that they belong in reality rather to the arterial system.—The action of the heart consists in an alternate contraction and relaxation, by which at one instant it receives the blood from the veins and at another propels it into the arterial system. In this process the two auricles, right and left, contract simultaneously; and the two ventricles subsequently contract, also at the same instant with each other. Still the auricular and ventricular contractions are not distinctly and separately alternate with each other, to the same extent as the strokes of the two pistons of a force pump. The action of the heart appears rather to consist in a single continuous contraction, which begins at the auricle and thence runs forward to terminate at the ventricle. The ventricular action is much more powerful than that of the auricle; and of the two ventricles the left is so much the more important in size and strength, that mainly to the action of this part are due the changes in form and position of the heart at the instant of contraction. The contraction of the ventricles is almost instantly followed by their relaxation; and while in this condition they are gradually filled by the blood flowing steadily into them from the veins and through the quiescent auricles. Then comes the contraction of the auricles, which completes the distention of the ventricular cavities; and this distention is at once followed by the vigorous contraction of the ventricles, discharging their blood in great abundance, to be followed again by a period of relaxation. This is the succession of the phenomena which present themselves when the heart is seen in activity during life.—At every ventricular contraction the substance of the heart becomes harder; it twists slightly upon itself from left to right; and its point strikes the walls of the chest, in the human subject, in the fifth intercostal space, a little to the left of the edge of the sternum. The induration of the organ at the moment of its activity is due to its muscular nature, since the same tension and momentary induration can be felt in any of the voluntary muscles in contraction. Such a muscle, when in activity, becomes swollen and at the same time harder

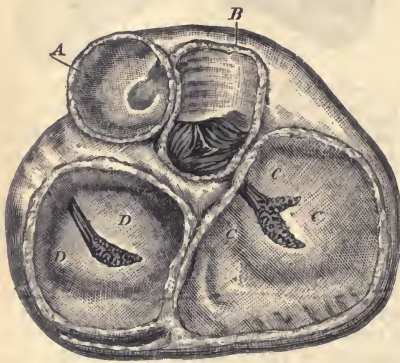


FIG. 3.—Horizontal Section of the Human Heart, at the level of the Ventricular Orifices.

A. Orifice of pulmonary artery. B. Orifice of aorta.
C, C. Tricuspid valves. D, D. Mitral valves.

sheet with three main points or divisions, whence it is called the tricuspid valve. Its floating edges are easily displaced from the auricle toward the ventricle, thus allowing the blood a free passage in this direction; but on being forced backward, from the ventricle toward the auricle, its free edges come in contact with each other and are firmly held in this position by a number of tendinous chords running from its edge and under surface to the inner wall of the ventricle below, which are now put upon the stretch. Thus the passage from the ventricle to the auricle is completely closed, and it can be opened only in a forward direction. The left ventricular valve is similar to the right, except that it consists of only two main pointed sheets, like the two halves of a bishop's mitre; it is therefore called the mitral valve. It is supported in position by tendinous chords, as in the former instance (fig. 3). At each of the arterial orifices are three valves,

to the touch; and the induration disappears when the muscle becomes relaxed. That the induration of the heart really coincides in time with the contraction of the ventricle and the compression of the blood, may be easily shown by an experiment first performed by Harvey, namely, by thrusting a small metallic canula through the substance of the left ventricle into its cavity, upon which the blood is driven out from the external orifice of the canula in interrupted jets, each jet corresponding in time with the induration and tension of the substance of the heart. The movement by which the point of the heart strikes the walls of the chest produces a visible and tangible undulation of the integument at the fifth intercostal space. This is called the "impulse." The impulse is a valuable guide for the physician in many cases, as it is increased to an abnormal degree in cases of hypertrophy of the heart, and also displaced from its natural location when the organ is enlarged or from any cause altered in position. The heart is loosely attached, at its base, by means of the great vessels to the anterior surface of the spinal column; but its body and apex are nearly unconfined, being covered only by the pericardium, whose exterior is itself a serous membrane, being invested by the free surface of the pleura. Consequently, while the base of the heart is generally fixed, the point of the organ may move in various directions when compressed or encroached upon by neighboring growths. When the heart is simply enlarged, its point is turned further toward the left side. When the pericardium is distended with an accumulation of serum, the point of the organ fails to reach the walls of the chest, and the impulse disappears altogether. When there is an accumulation of fluid in the left pleural cavity, the point of the heart may be turned completely over to the right of the sternum, so that the impulse may be felt on that side. There are also cases, though rare, in which, from a congenital malformation, the relative position of all the internal organs is reversed, the heart being placed on the right side, the liver on the left, the spleen and great pouch of the stomach on the right, &c. The abnormal position of the heart may be more easily distinguished during life than that of any other internal organ, owing to its very perceptible impulse against the walls of the chest.—The action of the heart is accompanied by two peculiar sounds, very audible when the ear is applied to the front part of the chest. These sounds follow each other, in the healthy condition, with perfect regularity, and are both produced at each cardiac contraction. They are known as the first and second sounds of the heart. The first sound occurs at the instant of the ventricular contraction. It is distinct, but slightly prolonged, and is heard most plainly over the anterior and lateral surface and toward the apex of the organ. It is produced by the shutting back and sudden tension of the ventricular valves, combined, ac-

ording to some authorities, with the muscular action of the heart's walls and the passage of the blood through its cavities. The second sound, which immediately follows the first, is shorter, but sharper and clearer. It is heard most distinctly over the sternum at the level of the third costal cartilage. Doubtless it is due exclusively to the shutting back of the arterial valves (aortic and pulmonary); since, in the first place, it is heard with remarkable clearness directly over the situation of these valves, and becomes fainter and less marked as the ear is moved further away; and secondly, it has been found by experiment upon the larger animals that if these arterial valves be hooked back by a curved needle introduced into the base of the great vessels, the second sound immediately disappears, but returns again as soon as the valve is liberated. The character, regularity, position, and relative intensity of these sounds often become valuable signs to the medical man in determining the nature and progress of affections of the heart.—The pulsations of the heart follow each other, in every species of animal, with a certain degree of rapidity. Generally speaking, this rapidity is greater in the warm-blooded, less in the cold-blooded animals. In species of the same class, the pulsations are more rapid in the smaller, less so in the larger. In the human subject the average rapidity of the cardiac pulsations, for an adult male, is about 70 a minute. They are more frequent, as a rule, in young children and in the female sex; and there are variations in this respect, within certain limits, in particular persons, owing to individual peculiarities of organization. Thus it would not necessarily be an abnormal sign to find in any particular person the habitual frequency of the heart's action from 60 to 65, or from 75 to 80 a minute. As a general rule, the heart's action is slower and more powerful in fully developed and muscular persons, more rapid and feebler in those of slighter organization. In all cases the heart is temporarily excited to increased frequency of action by unusual exertion or by nervous excitement; and its pulsations also become more rapid in many diseased conditions, particularly those of a febrile character. The heart's action is always purely involuntary, being entirely independent of the will. Its persistency is very remarkable. In the warm-blooded animals the heart's action ceases in a very few minutes after the destruction of the nervous centres, or after the circulation of the blood in its own vessels is arrested by hæmorrhage, by ligature, by the stoppage of respiration, or by excision of the heart itself; since, like the other organs in these animals, it requires a constant supply of freshly arterialized blood to preserve its vitality. But in the cold-blooded animals it will continue to beat for many hours after it has been emptied of blood, and even after it has been cut out of the chest and separated from all its nervous and vascular connections. The pulsations of the separated heart have been seen

to go on in the eel for six hours, in the torpedo for nine hours, and in the salmon for twenty-four hours. In the turtle, the brain and medulla oblongata having been destroyed, the heart, left *in situ* but drained of blood, continued to pulsate for more than eight hours; and the heart of the same animal, cut out of the body, drained of blood, divested of pericardium, and exposed upon an earthen plate, continued its action for four hours. This shows that the heart, as a muscular organ, is endowed with an unusual degree of irritability. Other muscles contract only occasionally, on the application of a special stimulus; but with the heart the contractions are incessantly repeated, with only momentary intervals of relaxation, from the first periods of embryonic existence to the latest moment of life. This irritability is so great that the contact of any foreign substance, even that of the atmospheric air or the plate upon which the separated organ rests, is sufficient to produce a contraction, which is repeated at intervals as soon as the muscular irritability has again accumulated by a short interval of relaxation. During life, it is believed, the immediate stimulus to each cardiac contraction is the filling of its cavities by the blood which flows into them. When this distention is complete, the ventricles respond by a contraction, empty themselves, and then remain quiescent until again filled to their full capacity, when the motion is repeated. But for this to go on, as it does, indefinitely, the inherent irritability of the heart must be very great, as compared with other muscles; and in fact, as mentioned above, its motions may continue to be excited for a considerable period by the contact of the external atmosphere or other foreign bodies.—In the inferior animals the heart varies in size, form, and construction, according to the general external configuration of the body, and particularly according to the arrangement of the organs of respiration, and the activity with which this function is performed. In the warm-blooded animals, namely, mammalia and birds, whose respiration is very active and performed by lungs, the heart is a double organ with four cavities, as in man; consisting of a right auricle and right ventricle destined for the pulmonary circulation, and a left auricle and left ventricle for the general circulation. Since in these animals, in order to provide for the necessary activity of respiration, all the venous blood must constantly pass through the lungs before reaching the arterial system, the two sets of cavities in the heart are completely distinct from each other, the venous blood being carried exclusively to the lungs for aëration, and the pure arterialized blood alone being disseminated through the arterial system. But in the reptiles which are air-breathing animals but of sluggish respiration, the two ventricles are imperfectly separated from each other, the septum between them being more or less perforated, or, as in the crocodiles, the two ventricles communicating with the same artery.

In the batrachia, the heart consists of but three cavities, two auricles, and one ventricle. Thus the venous blood from the right auricle and the aërated blood from the left auricle are mingled in the cavity of the single ventricle, and this mixed blood is sent partly to the lungs and partly to the general circulation. Thus the blood sent to the organs of the general circulation is never so highly aërated as in the mammals, and the blood sent to the lungs is never completely venous. This is no doubt one reason why respiration can be so long suspended in these animals without producing death. In fishes there is but a single auricle and a single ventricle, destined to receive the venous blood coming from the body, and to propel it into an arterial trunk, by which it is conveyed to the gills. After passing through these organs the arterialized blood is again collected in a single trunk corresponding to the aorta, and thence distributed throughout the body. In the fishes, accordingly, the entire heart represents the right side of that organ, as it exists in the mammalia; its contractions being sufficient to insure the passage of the blood through the organs of respiration, and afterward also through the whole arterial system.

HEART, Diseases of the. The diseases of the heart are: 1, inflammatory affections; 2, organic diseases, or structural lesions; and 3, functional disorder. The inflammatory affections are distinguished from each other and named according to the particular structure inflamed. Inflammation of the serous membrane which covers the organ and lines the heart sac (pericardium) is called pericarditis. Inflammation of the membrane lining the cavities of the organ (endocardium) is called endocarditis. Inflammation of the substance of the organ (muscular and connective tissue) is called myocarditis or carditis. I. INFLAMMATORY AFFECTIONS.—*Pericarditis.* The inflammation in pericarditis may be either acute or subacute and chronic. Acute pericarditis is characterized by the same local morbid effects essentially as acute inflammation affecting other analogous serous membranes, as for example acute pleurisy. The inflammatory product called coagulable lymph or fibrinous exudation is found after death in more or less abundance, covering the inflamed membrane, together with the effused liquid or serum, the quantity of this varying in different cases, and holding in suspension flakes of lymph. If recovery take place, the lymph and the serum disappear, and in place thereof new tissue is formed causing permanent adhesion of the heart to the pericardial sac, either wholly or in part. An entire obliteration of the space between the heart and this sac, by means of this newly formed tissue, is not incompatible with the continuance of life and health. Acute pericarditis may be produced by penetrating wounds or contusions of the chest. Exclusive of these so-called traumatic causes, the affection occurs in connection with acute articular

rheumatism, or rheumatic fever. The affection is generally secondary to some other disease, most frequently rheumatism. It sometimes occurs in connection with either acute or chronic disease of the kidneys; also in some cases of pleurisy and pneumonia. It is a rare complication in cases of pyæmia, scurvy, erysipelas, and the eruptive and continued fevers. As a primary affection it is exceedingly rare. An attack of pericarditis is generally indicated by acute, lancinating pain, referred to the region of the heart, increased by a deep inspiration. Its intensity varies considerably in different cases, being sometimes excruciating, and sometimes slight or even wanting. There is also more or less tenderness on pressure over the region of the heart, and its action is notably increased. With these local symptoms are associated those pertaining to the system at large which accompany symptomatic fever. As the affection is almost always developed in connection with other diseases, the symptoms of the latter are of course combined with those of the former. After a time, which in some cases consists of only a few hours, the local symptoms are liable to be modified by the effects of the accumulation of liquid within the pericardial sac. The movements of the heart are restrained in proportion as the liquid is abundant and rapidly effused. The pulse may now become feeble and irregular, and the patient suffer from a distressing sense of oppression, which is increased by any muscular exertion or by emotional excitement. The compression of the heart may be the cause of death, which sometimes occurs suddenly after some exertion or excitement.—The diagnosis or recognition of pericarditis has been rendered prompt and positive by means of auscultation and percussion. Soon after the attack, the exudation of fibrine occasions a friction sound with the heart's movements, and this is proof of the existence of the disease. Afterward, when considerable liquid has been effused into the sac, the friction sound may cease, but it is practicable to determine the presence and the quantity of liquid within the sac by physical signs, which are obtained by auscultation and percussion. The danger in cases of pericarditis depends, other things being equal, on the intensity of the inflammation, the quantity of exuded fibrine, and the amount of effused liquid. Aside from these conditions, much depends on the diseases with which it is associated. When developed in connection with rheumatism, it ends in recovery in the majority of cases; but occurring in connection with disease of the kidneys, with pleurisy or pneumonia, and in cases of pyæmia, it ends in death much oftener than in recovery. When death is not sudden, the disease destroys life by slow asthenia or exhaustion.—As regards treatment, acute pericarditis claims in general the measures indicated in other inflammatory affections. These measures, however, are in many cases to be modified by the circum-

stances pertaining to the diseases with which this is associated. A very important fact proper to the affection, however, is that the source of danger is the weakness of the heart as a direct effect of the inflammation, and as caused by the pressure of liquid within the sac. This modifying fact contra-indicates active measures of treatment which in themselves tend to impair the power of the heart's action. Whenever the effusion of liquid is such as to compress the heart, measures having for their object the absorption of the liquid are indicated. In the treatment of rheumatism an important object is to prevent the development of this complication; and clinical experience has shown that this object is promoted by the use of alkaline remedies.—Chronic pericarditis may be a sequel of the acute affection, or the inflammation may be subacute from the first. In some cases the inflammation continues with an abundant exudation of lymph, agglutinating the inner surfaces of the sac, and proving fatal by slow exhaustion. In other cases a large accumulation of liquid takes place, amounting to several pounds in weight; and to the exhaustion incident to the persistence of the inflammation is added the compression of the heart thus occasioned. In both varieties the disease, as a rule, proves fatal sooner or later. A few cases have been reported in which the liquid has been removed by puncture of the chest, and relief of distressing symptoms has been thereby obtained. The removal of liquid from the pericardial sac through a very small canula by means of suction, or, as it is called, aspiration, can be effected without danger from the operation, and it remains to be ascertained whether in some instances recovery may not follow.—*Endocarditis.* In this affection the inflamed membrane is in contact with the blood contained within the cavities of the heart; hence, although fibrinous exudation takes place as in pericarditis, the exuded lymph is in a great measure washed away from the membrane and carried into the circulation. A portion, however, adheres to the membrane, roughening the surface in contact with the blood, and giving rise to an abnormal sound (an endocardial or bellows murmur), which is an important physical sign of the disease. Moreover, upon the little masses of lymph which adhere to the membrane coagulated fibrine from the blood contained in the cavities of the heart is apt to be deposited; and in this way are produced the so-called vegetations or warty growths which, being sometimes detached and carried into the arteries with the current of the blood, are arrested in vessels too small to allow of their further progress, become fixed, and occasion an obstruction which may lead to hæmorrhage (hæmorrhagic infarctions), and to the impairment of nutrition within a circumscribed area beyond the point at which the obstruction is seated. These movable plugs or emboli, as they are termed, play an important part-

in affections proceeding from disturbance of the circulation and nutrition in different organs of the body, more especially the brain. (See BRAIN, DISEASES OF THE.) The phenomena thus produced are treated of by medical writers under the head of embolism, and the study of these phenomena within the last quarter of a century has enlarged in no small degree the boundaries of pathological knowledge. The local effects of endocarditis are also of much importance as laying the foundation for progressive changes, especially in the valves of the heart, constituting what are called valvular lesions. The inflammation in endocarditis is generally limited to the left side of the heart, that is, to the endocardial membrane lining the left ventricle and the left auricle.—Like pericarditis, this is very rarely a primary disease; and in the great majority of cases it occurs in connection with acute articular rheumatism. It is evidently due to the same internal agency which in rheumatism causes the inflammation within the joints, this agent being a morbid principle in the blood, supposed to be lactic acid. Endocarditis occurs in a much larger proportion of cases of acute articular rheumatism than pericarditis. These two diseases are associated whenever rheumatic pericarditis occurs; in other words, the latter affection rarely if ever occurs in rheumatism without the co-existence of endocarditis. The development of endocarditis is attended with little or no pain or other subjective symptoms referable to the heart; and hence the knowledge of its existence followed the application of auscultation to the study of diseases of the chest. The diagnosis rests wholly upon physical evidence obtained by auscultation. The roughening of the endocardial membrane within the left ventricle causes, as already stated, an adventitious sound or murmur, and the production of this murmur while a patient is under observation constitutes the proof of the presence of the affection. The diagnostic murmur accompanies the first sound of the heart, and is referable to the mitral valve. The immediate danger from endocarditis is slight; indeed, there is no immediate danger to life except from the formation within the heart of a clot (thrombosis) of sufficient size to arrest the circulation either within the heart or the large vessels. The liability to embolism has been already referred to, but this is seldom if ever directly fatal. The affection, however, is by no means one of small importance, the danger being that valvular lesions may be the result. These lesions, progressively increasing, may at a period more or less remote, often after the lapse of many years, occasion death.—As regards treatment, endocarditis calls for no active measures. It is important that undue action of the heart be prevented as far as possible by enjoining mental and physical quietude, and relieved, if it exist, by soothing remedies. The alkaline treatment in cases of rheumatism is preventive to a certain extent of this affection, as it is of peri-

carditis. It is probable also that the judicious use of alkaline remedies moderates the intensity of the endocardial inflammation, and thereby diminishes its local effects.—*Carditis, or Myocarditis.* Inflammation of the substance of the heart, irrespective of the pericardium and the endocardium, is extremely rare. Suppurative inflammation, however, sometimes occurs, giving rise to an abscess in the walls of the organ or in the septum between the ventricles. The pus contained in the abscess may be discharged into the pericardial sac, causing pericarditis, or into the ventricular cavity, causing purulent infection of the blood (pyæmia). Induration produced by a morbid increase of the tissue which unites together the muscular fibres, is another effect of inflammation seated in the walls of the organ. There are no means of determining during life the existence of carditis or myocarditis. II. ORGANIC DISEASES. The organic diseases or structural lesions to which the heart is liable relate, first, to the valves and orifices, and second, to the walls of the organ.—*Valvular Lesions.* In the great majority of cases these are seated in the left side of the heart, being either mitral or aortic, or in both the situations indicated by these terms. The changes embraced under the name valvular lesions are various, arising from morbid thickening or attenuation, calcification (formerly called ossification), rupture of valves, &c. The various changes, however, produce their evil results chiefly in two ways, namely, by affecting the valves so as to render them more or less incompetent to perform their functions, and diminishing the size of the mitral or aortic orifice so as to produce more or less obstruction to the passage of blood. The lesions which render the valves incompetent permit the blood to flow backward or regurgitate, and hence they are sometimes distinguished as regurgitant lesions. On the other hand, those which diminish the size of the orifices prevent the free passage of the blood in its direct or onward course, and hence they are termed obstructive lesions. Not infrequently the lesions are such as to involve both regurgitation and obstruction at the same orifice. The lesions may be situated at either the mitral or the aortic orifice, or at both orifices; and in some instances one or both of the corresponding orifices in the right side of the heart, the tricuspid and the pulmonic, are the seat of analogous lesions.—Obstruction of the flow of blood through the orifices within the heart, and regurgitation, lead to enlargement of the organ and to various morbid effects in other organs. The effects of mitral lesions relate especially to the lungs. Owing to the congestion of the lungs induced by obstruction and regurgitation at the mitral orifice, the changes in the blood effected by respiration are impeded, whence the sense of want of breath which in certain cases of disease of the heart is the source of great distress. Hæmorrhage into the air tubes and into the air cells sometimes results from the

congestion due to mitral obstruction. An effect of the persistent pulmonary congestion caused by mitral lesions is an over accumulation of blood in the cavities of the right side of the heart, and from this effect follows general dropsy. Aortic lesions interfere especially with the circulation throughout the arteries of the system; the immediate effect is to keep the left ventricle over-distended with blood. The regurgitant lesions in this situation render the supply of arterial blood to the heart itself insufficient, and more than any other involve the liability to sudden death. It is a popular impression that all organic affections of the heart involve this liability. This is far from being true; sudden death occurs in only a small proportion of cases.—Valvular lesions generally occur as a sequel of acute articular rheumatism. They often take place slowly, and for a long time they are latent as regards any symptoms of which the person affected is conscious. Their progress, as a rule, is unattended by pain, and in general it is not until they have induced a certain amount of enlargement of the heart that the evils just referred to begin to be apparent. Not infrequently many years elapse before they give rise to any marked effects. When not a sequel of rheumatism, they may arise from changes in nutrition incident to old age, and they are sometimes due to syphilis. The valves of the heart may be imperfectly developed, or lesions may result from disease occurring in fetal life. These congenital lesions are oftener seated in the right than in the left side of the heart. In a considerable proportion of the cases of young children affected with organic disease of the heart, the primary lesions are congenital.—The diagnosis of valvular lesions has been rendered very complete by means of auscultation. With very rare exceptions, they give rise to adventitious sounds, or murmurs, the characters of which, as regards their situation, their transmission in different directions, and their relations to the heart sounds, enable the physician not only to determine the existence of lesions, but to localize them, and to distinguish between those which involve obstruction and regurgitation. Moreover, the normal heart sounds are modified in such a way as to afford information of the extent to which the valves are injured by the lesions. Auscultation, indeed, enables the physician to determine the existence, the seat, and the character of valvular lesions, long before they have occasioned any apparent morbid effects of which the patient is conscious.—When valvular lesions have advanced sufficiently to produce obvious symptoms referable to either obstruction or regurgitation, or to both, they will destroy life sooner or later. The duration of life varies within wide limits; often a great amount of injury is tolerated for a long period. The lesions are irremediable, and therefore the treatment does not embrace recovery as an object; but much may be done by judicious manage-

ment to relieve symptoms, to postpone serious evils, and to prolong life. The more important of the measures of management relate to a proper regulation of the habits of life as regards diet, exercise, &c. While excessive muscular exercise is to be avoided, such an amount as is taken without discomfort may be highly useful by improving the general condition of the system. While excesses in eating and drinking are hurtful, a deficient alimentation is not less so. In brief, a great end of treatment is to render the system tolerant of the lesions as much and as long as possible, and this end is promoted by such a course of management, hygienic and medicinal, as conduces to the general welfare of the economy.—*Enlargement of the Heart.* This is of two kinds, namely, enlargement due to an increase of muscular structure, and enlargement from increased size of the cavities. The first is represented by greater weight of the heart, and is called hypertrophy; the second is distinguished as dilatation, and is represented by augmented volume, without necessarily any increase of weight. But whenever the heart is considerably enlarged, the two kinds of enlargement, as a rule, are combined; and when combined, an important distinction relates to the predominance of either the hypertrophy or the dilatation. Enlargement from an increase of muscular structure, without dilatation, is called simple hypertrophy; and enlargement solely from increased size of the cavities is called simple dilatation. Enlargement by hypertrophy is the result of an abnormal growth of the muscular structure; and the growth of this involuntary muscle takes place, just as voluntary muscles are made to grow, by long continued increased exercise. An immediate effect of obstructive and regurgitant valvular lesions is an undue accumulation of blood in certain of the cavities of the heart; the organ is thereby stimulated to increased power of action, and in this consists the pathological connection between valvular lesions and hypertrophy. But hypertrophy has its limitations; like the voluntary muscles, the muscular structure of this organ can only grow to a certain extent. It is a noteworthy fact that hypertrophic growth of the heart under the circumstances noted, so far from being an evil, is a positive advantage. The muscular strength of the organ being augmented by its muscular growth, it is enabled better to carry on the circulation despite the difficulties pertaining to the valvular lesions. In this point of view, hypertrophy of the heart is conservative or compensating. When hypertrophy has reached its maximum, the undue accumulation of blood in the cavities of the heart leads to dilatation; the walls yield more and more to the distention. Thus, in general, hypertrophy precedes dilatation, the latter taking place after the muscular structure has increased to the extent of its ability to grow. Causes other than valvular lesions may give rise to enlargement by hypertrophy and dilata-

tion. Emphysema of the lungs, and sometimes other affections which impede the free circulation of blood through these organs, involve an over filling of the right ventricle with blood; and the mechanism of the hypertrophy and dilatation which follow is the same as when the enlargement is caused by valvular lesions. Enlargement also occurs in some cases of chronic disease of the kidneys, the probable explanation being that the circulation through the capillary vessels is impeded, and hence the heart is excited to increased muscular exertion. Enlargement of the heart in different cases has its primary seat in different portions of the organ, and the enlargement of certain portions predominates. Thus valvular lesions at the aortic orifice induce first and especially enlargement of the left ventricle; mitral lesions lead particularly to enlargement of the left auricle and of the right ventricle; pulmonary emphysema leads to enlargement of the right, and renal disease to enlargement of the left side of the heart. These facts are sufficiently explained by the immediate bearing of the causative conditions on the blood currents and the quantity of blood in the different cavities of the heart. It is a question whether enlargement is ever a result of the disturbances of the heart's action embraced under the name functional disorder. Cases in which this causative relation exists are certainly extremely rare.—The symptoms and morbid effects of enlargement vary much according as hypertrophy or dilatation predominates, or as either exists without the other. The effects referable to hypertrophy are due to the increased power of the heart's action, proportionate to the increase of its muscular structure. If hypertrophy exist alone, or if it greatly predominate, this increased power is represented by an increased momentum of the blood in the arteries. Active congestion, more especially within the skull, is sometimes a consequence. This effect would be of much more frequent occurrence were it not that in most cases of hypertrophy there are valvular lesions which tend to diminish the quantity of blood sent into the arteries. Aortic and mitral lesions, either obstructive or regurgitant, have this tendency, and hence they are conservative as regards the prevention of active congestion of the brain and other organs. The effects of dilatation are the opposite of those referable to hypertrophy. Dilatation involves weakness of the heart, and its ability to propel the blood through the arteries is lessened in proportion as the heart is dilated. This power of enlargement is not, like hypertrophy, compensatory or conservative, when associated with valvular lesions; on the contrary, many of the evils of organic disease of the heart are attributable to the weakness incident to it. Dilatation of the right side of the heart resulting from mitral lesions stands in immediate relation to general dropsy, and in a certain degree to the defective pulmonary circulation. Dilatation of the left ventricle resulting from aortic le-

sions renders this part more liable to become distended with blood, causing paralysis of the muscular walls and sudden death.—Enlargement of the heart and its extent are easily determined by means of physical signs furnished by the touch (palpation) and percussion. By the touch it is found that the apex beat is more or less lowered and carried to the left of its normal situation. Between the apex and the base of the organ are often found impulses not perceptible in health. By percussion the boundaries of the organ are readily ascertained in the great majority of cases. The vocal resonance also, as heard with the stethoscope, enables the physician to define the limits to which the organ extends. Palpation and auscultation furnish signs by which predominant hypertrophy may be differentiated from dilatation. If hypertrophy predominate, the impulses of the heart as felt by the hand are strong, and often there is a heaving movement extending over the region of the heart. The first sound of the heart, over the apex, is abnormally loud, long, and booming. On the other hand, if dilatation be considerable or great, weakness of the organ is denoted by feeble impulses and by diminished intensity together with shortness and a valvular quantity of the first sound of the heart in the situation of the apex. With these physical signs are associated, on the one hand, symptoms and effects denoting a morbid increase of the power of the heart's action in hypertrophy, and on the other hand, in dilatation, those proceeding from a morbid feebleness of the organ.—Hypertrophy of the heart seldom calls for treatment with a view to lessen or remove this lesion. To do this would in general not be desirable were it practicable; and it is not practicable, because the hypertrophy is in most cases a result of conditions which of necessity continue. It would not be desirable, inasmuch as the lesion protects against the evils which would otherwise flow from the causative conditions, and it is therefore a conservative provision against these evils. It is different with dilatation; it is desirable to prevent the progress of this kind of enlargement, and to obviate the weakness of the heart which it induces. Measures of treatment may do considerable toward the accomplishment of these objects. The heart may often be strengthened by dietetic, hygienic, and medicinal measures to promote assimilation and nutrition; and in as far as the muscular structure of the heart is rendered strong and vigorous, it is less likely to yield to the distention of the blood within its cavities and become more and more dilated. There are some remedies which seem to exert a direct tonic influence upon the muscular structure of the heart. Digitalis is pre-eminently a remedy of this character. By the judicious use of this remedy in conjunction with hygienic treatment, the heart sometimes regains in a measure the strength which has been impaired by dilatation, the distressing

evils which have already ensued being greatly relieved. This latter statement has reference especially to dropsy and suffering from a sense of the want of breath. Life may be often prolonged and the tolerance of the lesion promoted by appropriate management.—*Atrophy of the Heart.* This is a lesion the reverse of enlargement, the term denoting a morbid diminution of the size of the organ. The heart is greatly diminished in size, and in some cases of great emaciation its weight may be reduced to $4\frac{1}{2}$ oz. Under these circumstances the atrophy is in accordance with the general condition, and gives rise to no special morbid effects. Atrophy may be produced by the adhesions which result from pericarditis, and the diminished muscular power thus induced may give rise to morbid effects dependent on feebleness of the circulation. As the size of the heart can be determined with much precision by physical signs, the diagnosis of atrophy is practicable. From its infrequency, however, and the very small proportion of cases in which it has pathological significance, it is not a lesion of much importance.—*Fatty Degeneration.* This term is not applied to the deposit of fat upon the heart or between the muscular fibres of its walls. The organ is sometimes overloaded with fat in these situations, and is doubtless thereby burdened; but serious consequences never follow. Fatty degeneration of the heart means a substitution of fat for the proper muscular substance, and this takes place without as well as with an increase of the adipose tissue of the organ, and is a lesion of serious import. It is evident that in proportion as fat is substituted for the muscular substance, the power of the heart's action must be weakened. If the structural change be considerable and extensive, morbid effects and danger arise from the enfeebled circulation. The pulse is small, compressible, irregular, and sometimes notably slow; there is breathlessness on exertion; the patient readily faints, and there is danger of death from over distention of the cavities of the heart. The lesion involves softening of the muscular structure, sometimes resulting in rupture. There are no special physical signs which denote this lesion, but auscultation and palpation show persistent weakness of the heart's action. The apex impulse is feeble or not appreciable, and the first sound of the heart is feeble, short, and valvular over the apex. The lesion may exist alone, or it may coexist with valvular lesions and enlargement; in the latter case its existence is not easily determined. When it exists alone the diagnosis may be made with much positiveness, taking the symptoms and signs which have been mentioned in conjunction with the following facts: Fatty degeneration occurs rarely before middle age; it exists more frequently, but by no means invariably, in connection with general obesity; and it is often accompanied by the fatty change in the cornea known as the *arcus senilis*. The treatment

consists of a highly nutritious diet, into which fatty articles should enter sparingly, together with the employment of hygienic measures and remedies designed to give tone to and to invigorate the heart. The lesion is irremediable; that is, the fibres which have undergone degeneration are never restored to their normal condition. All that is to be hoped for from treatment relates to the tolerance of the affection for an indefinite period, and the relief of symptoms.—*Miscellaneous Lesions.* Softening of the muscular structure of the heart, irrespective of fatty degeneration, may occur in connection with the continued and eruptive fevers, scorbutus, pyæmia, and other diseases. It is due to disturbed nutrition, and is accompanied by great feebleness of the circulation. Softening as thus produced is not irremediable; restoration takes place on recovery from the diseases to which it is secondary.—*Rupture of the heart* has been mentioned as an accident occurring in connection with fatty degeneration. It may occur also as a result of circumscribed suppurative inflammation in the muscular walls, and of aneurismal dilatation. It is one of the causes of sudden death. If the rupture be of sufficient size to admit of the free escape of blood into the pericardial sac, the loss of blood and the compression of the heart by the blood accumulating in the sac, prove immediately or quickly fatal. Sometimes, however, the opening is so small that death is slowly produced, and cases have been reported in which the orifice has been temporarily closed by a coagulum of blood, and the escape of blood in sufficient quantity to cause death has been delayed from one to two days. Cicatrization and recovery are perhaps not beyond the limits of possibility, but it may be doubted whether there is an authentic case on record.—Cancer, hydatid cysts, fibrous growths, calcareous deposits, and other affections involving serious lesions, are very rarely seated in the heart; and when they are, their existence cannot be determined during life.—Wounds of the heart with perforation of the walls are of necessity fatal, death taking place as in cases of rupture. Foreign bodies, however, may remain imbedded in the muscular substance without giving rise to any serious inconvenience for an indefinite period. The writer has seen a specimen in which a pistol ball was found in the walls of the right ventricle, the patient having received the wound 20 years before his death, and the cause of death being an attack of pneumonia. III. FUNCTIONAL DISORDER OF THE HEART. Under this name are embraced all kinds of disturbed action occurring irrespective of either inflammation or any structural lesion. The forms of functional disorder are various. A frequent form is that commonly known by the name palpitation, consisting of violent or tumultuous action, of which the patient is distressingly conscious, occurring in paroxysms very variable as regards their duration and their recurrence. In severe cases patients of-

ten say that the heart seems to rise into the throat, or it seems to be struggling to get out of the chest. Frequent intermittency of the heart's action is another form; the patient is sensible of the intermissions, and feels as if there was danger at any instant of the heart ceasing to act. In some cases the heart acts regularly, but with more or less rapidity. Patients sometimes describe a sensation of fluttering in the chest. A strong beat followed by a feeble beat, the latter sometimes not giving rise to a pulsation at the wrist, and this alternation going on regularly for hours, days, or weeks, is a curious form of disorder; and want of union in the action of the right and the left ventricle, causing reduplication of the sounds of the heart, is another equally curious. In most instances functional disorder occasions great anxiety and apprehension, patients thinking that there must be organic disease of the heart, and that they are in danger of sudden death. It is often very difficult to convince them that they have only a functional disorder, which, however distressing, is devoid of danger. The mental uneasiness caused by a functional disorder in general far exceeds that felt in cases of serious organic disease. From the sympathetic relations between the mind and the heart, functional disorder of the latter is frequently due to mental excitement and depression, and the disorder is apt to be increased or perpetuated in consequence of the attention becoming concentrated on the heart's action as represented by the beats and the pulse. Other causes which produce and keep up functional disorder are the immoderate use of tobacco, dyspeptic derangement, and abuse of the sexual function. Gouty persons are liable to it. It is especially apt to occur in connection with impoverishment of the blood (anæmia). There is a constitutional tendency to disorder of the heart's action in some persons, who may be said to have irritable hearts. These persons are often subject to it more or less during their lives. It is vastly important to discriminate between functional disorder and organic disease of the heart, inasmuch as the former is unattended with danger, and has little or no tendency to eventuate in the latter; and this assurance by the physician not only relieves needless anxiety on the part of the patient, but often does much toward effecting a cure. In determining that an affection of the heart is purely functional, a physical examination by means of auscultation and percussion must be made, and a positive conclusion can only be based on the result of this examination. If the result be negative, that is, if none of the signs of structural lesions be found, the inference is that the affection is functional. In order to reach this conclusion with positiveness, of course the physician must be confident in his ability to recognize the signs of organic diseases, and, therefore, to exclude them by finding no physical evidence of their existence. —In severe attacks of functional disorder, re-

lief is obtained by the use of narcotic remedies, such as belladonna or opium; and if persistent, cardiac sedatives, especially aconite, are useful as palliatives. An alcoholic stimulant sometimes affords temporary relief, and also the so-called antispasmodic remedies, such as valerian, asafoetida, and the ethers. With a view to permanent relief or the prevention of paroxysms, the causes which have been named are to be removed whenever these are ascertained; derangements of the digestive system, if present, are to be remedied if practicable; and if the patient be anæmic, it is important to restore the normal condition of the blood.—A remarkable affection consists in a persistent frequency of the heart's action, associated with enlargements of the thyroid gland (goitre), and in some cases with a notable projection of the eyeballs. This affection has received different names. It is often called "Graves's disease," from the fact that the connection between the functional affection of the heart and the goitre was pointed out by the late Dr. Graves of Dublin in 1835. The German writers designate it Basedow's disease, after a German observer who described it in 1840. Other names are exophthalmic goitre, exophthalmic cachexia, and anæmic protrusion of the eyeballs. A rapid action of the heart, the pulse ranging in different cases from 100 to 140 per minute, may continue uninterruptedly for many years. The goitre rarely progresses to a great extent. The projection of the eyeballs varies in different cases, being sometimes so great that the eyelids are unable to cover them, and giving to the face a strikingly ferocious expression. In most cases anæmia exists in a marked degree, and there is usually much nervous irritability. The pathology of the affection is obscure, but the disorder of the heart always precedes the goitre and the protrusion of the eyeballs. With our present knowledge, it is very little under therapeutic control. Sedative remedies to moderate the frequency of the heart's action, and measures having reference to the impoverished condition of the blood, are indicated, together with hygienic treatment to invigorate the system. Complete recovery is in general not to be expected; but the affection does not tend to destroy life, and may be tolerated for many years. The long persisting frequency of the heart's action may lead at length to enlargement of the organ. Moreover, the affection tends to impair the ability to resist any important disease which may become developed.

HEART'S CONTENT, a seaport of the district of Trinity, Newfoundland, on an inlet of the E. shore of Trinity bay, 37 m. N. W. of St. John's; lat. 47° 50' N., lon. 53° 20' W.; pop. about 900. It has a fine harbor, and the surrounding scenery is picturesque. The inhabitants are chiefly engaged in fishing, but farming and ship building are pursued to some extent. The Atlantic telegraph cables have their western terminus here.

HEAT, the natural force or principle which is known by its effects upon matter, causing it to expand, or to assume a solid, a liquid, or a gaseous condition, according to the degree with which it acts and the nature of the body. It is also known by its effects upon the sense of feeling, but only in a comparative manner; because a body at the same temperature may produce a sensation of heat at one time, and at another a sensation of what is called cold, in consequence of a variation of temperature in the organs of touch; and a body may at the same time seem cold to one hand and warm to the other. The science which treats of the phenomena and properties of heat is called thermotics. Two general theories of the nature of heat have been held from the earliest times: one regarding it as a kind of subtle matter which insinuates itself into the substance of bodies, and resides there with a greater or less manifestation of its presence; the other as simply a condition of matter, a force, or a molecular motion. Some of the ancients called it the fourth element, which by its levity rose to the highest place in the heavens and spread itself in ethereal lambent flames over the universe; and the ancient philosophers of all nations generally regarded it as a subtle efflux, an attribute or manifestation of creative power, or as the creative power itself, the vital spirit of the universe; and thus the sun was by many nations regarded with peculiar veneration, and adopted as the chief object of worship, forming the basis of religions which have been preserved by some peoples till the present time. Democritus (born 460 B. C.), regarded as the originator of the doctrine of atoms which in the hands of John Dalton twenty-two centuries later was elaborated to a highly philosophical theory, and which since his day has been placed upon a basis of almost mathematical precision, conceived heat to be an efflux of minute spherical particles, having a rapid motion by which they penetrated the densest substances. He believed that the finest of those particles formed the substance of the soul, and Lucretius held similar views. Aristotle considered it to be a condition of matter rather than a substance, and was probably the first to suggest an immaterial or purely mechanical theory. In later times Francis Bacon advocated the doctrine of its immateriality, and some passages in his *Novum Organum* are remarkable for the hints they contain of the dynamical theory of heat; he says: "Heat is a motion of expansion, not uniformly of the body together, but in the smaller parts of it; and at the same time checked, repelled, and beaten back, so that the body acquires a motion alternate, perpetually quivering, striving, and struggling, and irritated by repercussion, whence springs the fury of fire and heat." Descartes also, in his *Principia Philosophica*, has some observations foreshadowing the vibratory theory, in which he speaks of heat as being the motion of the insensibly small par-

ticles of matter, and upon this theory explains why bodies get hot under concussion. Locke, a half century later, places the theory in a still clearer light. "Heat," he says, "is a very brisk agitation of the insensible parts of an object which produces in us that sensation from whence we denominate the object hot; so that what in our sensation is heat, in the object is nothing but motion." (Works, vol. iii., p. 327, London, 1823.) The ideas of the old philosophers on the subject of heat possessed a good deal of vagueness, and were derived mainly from speculation, and not from actual experiment. They were not even put to the test of inquiry as to their adequacy to account for phenomena; and although they contained germs of truth, they cannot be regarded as much more than the remarkable opinions of great minds, who lacked the advantages of accurate chemical and physical investigations. Between the time of Descartes and Locke, Becher, a German chemist living in England, proposed a theory, more fully elaborated soon after Locke's time by Stahl under the name of the phlogistic theory, which held that phlogiston is the principle of heat, and that combustible matter is a union of this principle with ordinary matter, and that when this is burned the phlogiston is expelled. To account for the increase in weight of metals after calcination, it was held that the combination with phlogiston, in consequence of its buoyancy, rendered them lighter. The discovery of oxygen by Priestley, and the establishment of the oxygen theory of combustion by Lavoisier, overturned the phlogistic theory, but left in its place an equally material theory which regarded caloric as the imponderable element which constitutes heat. Lavoisier and Black were the great promulgators of the material doctrine, holding that caloric is an actual substance having the power of combining with ponderable matter and of passing from one body to another. The caloric theory lasted a long time, and perhaps did not obstruct the progress of science as much as is often thought, for many important results were obtained by experiments which were made under a belief in its truth. It was easier to conceive of definite quantities of a substance susceptible, as heat was, of measurement, than of quantities of motion which had not been demonstrated, and of which no definite conception had been formed. The doctrine that heat could not be produced, but was an original and indestructible element, passing from one body to another, was also a consequence of these views, and any experiments which seemed to demonstrate that heat could be generated by mechanical motion were calculated to overturn it. Such experiments were made by Count Rumford in 1796-'8, soon after by Sir Humphry Davy, and more recently by Mr. Joule of Manchester, by which it was demonstrated that mechanical power and heat were mutually convertible forces. A description of these experiments, and a discussion

of the doctrine of the convertibility of forces, will be found in the article **CORRELATION OF FORCES**. The experiments of Rumford and Davy were made about 80 years ago, but were not at the time regarded as conclusive; nor were the more refined demonstrations of Thomas Young of the truth of Huygens's theory of light. It seems to have required the later investigations of Fresnel, Cauchy, Malus, Melloni, Tyndall, Sir William Hamilton, and others, to adapt the undulatory theory to the explanation of all the phenomena of radiation, to render the mechanical demonstrations acceptable. It is interesting to observe the clearness with which Rumford and Davy so long ago stated their views upon the nature of heat. In a tract published in 1798, giving an account of his experiments at Munich, the former says: "It appears to me to be extremely difficult, if not quite impossible, to form any distinct idea of anything capable of being excited and communicated in the manner that heat was excited and communicated in these experiments, except motion." In a tract contained in a volume published at Bristol in 1799, Davy says: "Heat, then, or that power which prevents the actual contact of the corpuscles of bodies, and which is the cause of our peculiar sensations of heat and cold, may be defined a peculiar motion, probably a vibration of the corpuscles of bodies, tending to separate them." In his "Chemical Philosophy," published in 1812, he says: "The immediate cause of the phenomenon of heat, then, is motion, and the laws of its communication are precisely the same as the laws of the communication of motion." The dynamical theory of heat may therefore be stated in almost the words quoted above. It holds that heat consists in the vibratory motion of the particles of matter, and that it may be produced by mechanical force, such as friction, percussion, or compression, or by the electric current; or that it may be communicated by the undulatory ether, the medium of radiation. Its communication from one body to another when they are in contact, or through a homogeneous body, from particle to particle, constitutes conduction.—*Sources of Heat*. According to the nebular hypothesis of Laplace, heat is a primal force which caused all matter at one time to exist in a gaseous condition, which by the action of gravitation and other forces has been aggregated into masses assuming solid and liquid conditions. But the opinion has been advanced by J. R. Mayer and Waterson, and more recently elaborated by Helmholtz and Thomson, that the sun owes its heat to the force of gravitation acting upon the particles of matter, which at the beginning are assumed to have been at considerable distances from each other, and causing by their clashing together the evolution of heat. According to either theory, the sun is regarded as a vast storehouse of radiant heat from which the earth derives its supply, and has done for myriads of years, through most of the geolo-

gic ages. Estimations have been made by Pouillet which show that the sun emits a quantity of heat per hour equal to that which a layer of anthracite coal 10 ft. thick would yield in combustion. Chemical combination, including the combustion of fuel, is a secondary source of heat, originally derived from the sun, which furnished the energy necessary to the formation of the fuel. The intensity of heat produced by combustion attains its maximum in the oxyhydrogen blowpipe, in which a heat approaching 4000° F. is reached. Mechanical action, either in the form of compression, percussion, or friction, develops heat in quantities equivalent to the force converted into it. The electric current is another source of heat, and an example of the equivalent conversion of one force into another. When the current is produced by the rotation of magnets, there is a conversion of the mechanical force expended in effecting the rotation into electricity, and this under proper circumstances into heat. When the current is produced by the chemical action of a battery, the origin of whatever heat is obtained may be considered as arising from the combustion of the elements in the battery. The intensity of heat obtained by the electric current is considerably higher than that of the oxyhydrogen blowpipe, but the amount cannot be stated with any degree of accuracy.—*General Effects of Heat*. The most obvious effects of heat on matter are to cause it to expand and to assume different states, as the solid, liquid, and gaseous. Thus, under the ordinary pressure of the atmosphere, water at a temperature below 32° F. is a solid; between 32° and 212° it is a liquid; and above 212° it is in a gaseous condition. With a few exceptions, an increase of heat in bodies causes them to expand. Thus, a metallic bar which has a diameter just sufficient to enable it to be passed through an orifice, will by being heated become too large; the heat vibrations have been intensified, and the bar has increased in bulk. In what this slight expansion consists it is impossible to say with certainty; whether the molecules require greater space in which to vibrate, or whether they expand by a slight separation of the atoms of which they are composed, is not known; it is possible that both causes unite to produce the effect. When, however, a body by the application of heat is converted into vapor, a repulsive force is generated between the particles when a certain temperature is reached which produces a far different phenomenon from ordinary expansion; an active repulsion has been generated, which may exist between molecules, as in the vapor of water or alcohol, or between the atoms. Moreover, the atoms composing molecules may be completely separated, molecular disintegration, and consequently decomposition of the substance, taking place. Heat when it has such an effect is called the heat of dissociation, and is required in different degrees by different bodies. (See **DISSOCIATION**.) Thus, the atoms composing the

molecules of oxide of silver are dissociated at a comparatively low temperature, while the molecules of water require a white heat to produce dissociation between the hydrogen and oxygen atoms composing it. The elements of oxide of lead are also dissociated by a comparatively low temperature when oxygen is excluded, while to cause dissociation between the atoms of oxygen and iron in oxide of iron requires so high a heat that separation is difficult, except in the presence of a third body, an example of which is the reduction of iron ore by charcoal or anthracite, in which, however, the heat of dissociation is not reached. Advantage is taken in the arts of the expansion which heat produces in bodies for various industrial operations, such as the placing of tires on wagon wheels and the moving of immense weights or resistances, as the drawing toward each other of the walls of buildings. (See EXPANSION.) The construction of instruments for the measurement of heat is also founded upon the property of expansion. (See PYROMETER, and THERMOMETER.) It sometimes occurs that at the temperature at which a liquid solidifies there is expansion instead of contraction, as in the solidification of iron and bismuth, and also of water, a familiar example, in which the expansion is made obvious in the floating of the less dense ice; and mechanical advantage is often taken of this property of expansion during congelation to rend asunder masses of rocks or iron vessels. The phenomena and philosophy of combustion are treated under the title COMBUSTION; the expanding force of heat, particularly with reference to liquids and solids, under BOILING POINT and EXPANSION; the transmission of radiant heat, especially in connection with the diathermanous properties of different bodies, under DIATHERMANOY; the generation of heat by mechanical means and by electricity, and its correlation with these forms of energy, under CORRELATION OF FORCES, ELECTRICITY, FRICTION, and GALVANISM; and the causes of solar heat and its continuance or dissipation, under SUN. The remainder of this article will therefore be principally devoted to a consideration of the more general laws of radiant heat, of the conduction of heat, and of specific and latent heat. I. RADIANT HEAT. The undulatory theory of radiation will be treated in the article LIGHT, and only such of its laws will be given here as are necessary for the treatment of the subject, and some of the reasons which indicate the identity of the two forces. A beam of light from the sun, or from any highly incandescent body, consists of a great number of rays propagated by transverse vibrations in the ethereal particles. These vibrations are of variable amplitude, corresponding to the particular kinds of rays, and these rays have the property of being refracted when passing from one medium to another in an oblique direction, as when passing from air into glass, and again from glass into air or any other medium. Those rays which consist of vibra-

tions of greater amplitude have been found the least refrangible, and also to be those which in a greater degree than the others produce the effects of heat. When a beam of light is dispersed by a triangular prism made of rock salt, a highly diathermanous substance, there is formed a luminous spectrum of various colors in which heat is more or less distributed, abounding more in the red or least refrangible light than in other portions; but far more in that part of the spectrum which is composed of invisible rays of still less refrangibility than the red. It is estimated that the amount of heat contained in the invisible or non-luminous part beyond the red rays is more than seven times as great as that in the luminous part. Here, then, is a proof that rays of light and rays of heat are transmitted together in ordinary radiation of compound light. Now, if they are found to travel with the same velocity, their identity becomes probable, and this is shown by the fact that during an eclipse of the sun, at the conclusion of total obscuration, heat makes its appearance simultaneously with the rays of light; and finally, when it is found that the rays of light and heat observe the same laws of reflection, refraction, interference, and polarization, the conclusion is irresistible that the only difference between the two is that the less refrangible rays possess the greater heating power. Radiation of both light and heat is propagated in straight lines in a homogeneous medium, and unlike sound may be transmitted through a vacuum, a fact which indicates that it employs a different medium. If a sphere of glass, *a*, fig. 1, have a thermometer, *b*, sealed into it, with its bulb placed in the centre of the sphere, and if the air be exhausted through the tube *c*, which is afterward closed by the flame of a blowpipe, and then the sphere be surrounded by a heated body, as a piece of tin foil, the thermometer will indicate a rise of temperature. The radiation of heat follows



FIG. 1.

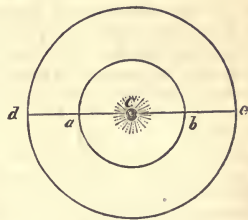


FIG. 2.

three important laws: 1. Its intensity is proportional to the intensity of the source. 2. It is inversely as the square of the distance. 3. Its intensity is less in proportion to the obliquity of the surface of the body emitting the rays. The first law is demonstrated by placing

a metallic cubical vessel at a certain distance from the blackened bulb of a thermometer, and filling it successively with water at different temperatures, as for instance at 20° , 30° , and 40° ; the temperatures indicated by the thermometer will be in the same ratio as those of the vessel containing the water. The second law follows from the geometrical principle that the surface of a sphere increases as the square of its radius. Let c , fig. 2, be a centre of radiation; it will emit a certain number of rays, all of which will fall upon the inner surface of the sphere $a b$, or in the absence of this, upon the inner surface of the sphere $d e$, which has a radius twice as great as $a b$. Therefore the same amount of heat will fall upon either of the spheres. But the outer sphere has a surface four times as great as the inner one; therefore it receives upon the same extent of surface only one fourth as much heat. The same law may be demonstrated experimentally by a method invented by Tyndall. He placed a

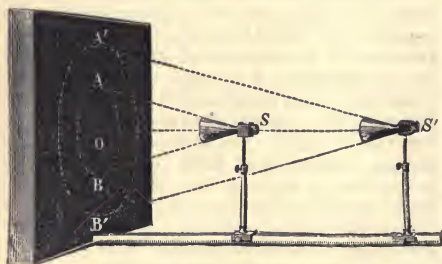


Fig. 3.—Law of Inverse Squares.

thermo-electric pile, S , fig. 3, in front of a rectangular vessel filled with hot water and having its face coated with lampblack. The pile is placed in the small end of a hollow cone, having its inner surface blackened, to prevent reflection. The distance of the pile from the vessel may be changed, but the quantity of heat received will be the same. If the distance at S' is twice that at S , the surface of the circle $A' B'$, whose rays fall upon the pile at S' , will have twice the radius and four times the surface of the circle $A B$, whose rays fall upon the pile at S . The third law is demonstrated as follows: Place a cube, a , fig. 4, filled

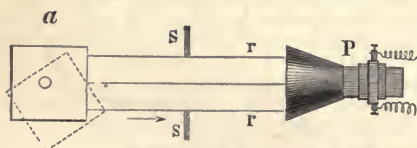


Fig. 4.

with hot water, in front of a thermo-electric pile, P , and also place a screen, $S S$, with an opening, between the cube and the pile. If the cube is first placed with its face perpendicular to the rays r, r , and is then turned upon its axis without changing the distance

of the centre of its face, but giving it an oblique position, the amount of heat indicated by the pile will remain the same, although rays from a greater extent of surface on the cube will pass through the opening in the screen. All bodies are regarded as possessing a certain degree of that molecular motion which constitutes heat, and as always emitting rays of heat, no matter what their temperature may be. Every body is constantly receiving rays of heat from all other bodies within the limits of radiation, and is at the same time returning rays of heat to these bodies. But the hotter bodies emit rays of greater intensity than those which they receive, so that they all have a tendency to arrive at a condition of equilibrium. This is called the doctrine of exchanges, and was proposed by Prévost, a professor at Geneva about the year 1790, under the name of the "theory of mobile equilibrium of temperature." If a body could be so placed that it should continue to radiate more heat than it absorbed, there would come a time when its vibrations would cease, and it would possess no heat whatever; in other words, it would arrive at a state of absolute zero. Modern physicists have assumed such a theoretical zero, and have calculated it to be at 459.13° below the zero of Fahrenheit's scale, or 273.85° below that of the centigrade. Newton was the first to enunciate a law of cooling, which was that "the quantity of heat lost or gained by a body at each instant is proportional to the difference between its temperature and that of the surrounding medium;" but it has been found not to be general, and only applies when the differences of temperature are not more than 15° or 20° C.; beyond that the loss or gain is greater than the law requires. No definite results were obtained till Dulong and Petit made a series of elaborate investigations, in which they placed the thermometer both *in vacuo* and in air. A large thermometer was used, containing about three pounds of mercury, and was placed in the centre of a hollow globe of thin copper having its interior surface covered with lampblack, and kept at a uniform temperature by immersion in a vessel of water, the bulb of the thermometer being hotter than the globe. The following are the results obtained when the globe was at the temperature of melting ice:

VELOCITY OF COOLING AT DIFFERENT TEMPERATURES.

Excess of temperature, in degrees F.	Velocity of cooling per minute.
439°	10.60°
396	8.51
360	7.40
324	6.10
288	4.89
252	3.88
216	3.02
180	2.80
144	1.74

It is thus shown that the velocity of cooling at 360° is more than three times as much as at

180°. It was found by Dulong and Petit that the velocity of cooling in a vacuum for a constant excess of temperature increases in a geometrical progression when the temperature of the surrounding air increases in an arithmetical progression, and that the ratio of this progression is the same whatever may be the excess of temperature. The experiments of MM. Provostaye and Desains confirm the results of Dulong and Petit. Radiation being the propagation in the luminiferous ether of undulations in consequence of molecular vibrations in the radiating body, it would be expected that different bodies would have different powers of radiation, and experiment shows this to be true. The apparatus used by Sir John Leslie is represented in fig. 6, and is the same that he employed for determining the reflecting powers of bodies. In experimenting on radiation, the plate *d* may be removed. The cube *a* has its sides coated with different substances, which may be turned at pleasure toward the mirror *b*, and the bulb of a differential thermometer may be placed in the focus *l*. Calling the radiating power of lampblack 100, he found that of other substances as follows:

Lampblack	100	Varnished lead.....	45
Whiting	100	Mercury	20
Paper	98	Polished lead.....	19
Sealing wax.....	95	Polished iron.....	15
White glass.....	90	Tin, gold, silver.....	12

It is commonly supposed that color has much influence on the radiating and absorbing power of bodies, but this is only true of luminous heat. If the cube used in the above experiment is filled with hot water, and three of its sides are covered, one with white, another with red, and another with black velvet, all of the same texture, the fourth of polished copper being left uncovered, it will be found that the three velvet sides will radiate alike, the naked side radiating the least. This shows that texture or molecular structure, rather than color, confers radiating power upon surfaces, for obscure heat. The power of a body to absorb heat is precisely proportional to its power of radiation; or in other words, its power of propagating undulations in the ether is equal to its power of accepting motion from the undulations of the ether, and is generally possessed in a greater degree by opaque than by transparent bodies, although there are remarkable exceptions, as will be seen by reference to the article DIATHERMANCY. The method employed by Leslie in determining the absorbing powers of bodies was to cover the bulb of the differential thermometer, fig. 6, with the substance to be experimented upon, and place it in the focus, removing the plate *d*. Tyndall has made elaborate researches upon the radiating and absorbing powers of gases, vapors, and flames, and has found them proportional when the same sources of heat were employed, and inversely proportional to their transmitting powers; but he also finds these properties to

vary with the sources of heat.—*Reflection of Heat.* That dark heat rays are capable of reflection, and that they obey the same laws as the luminous rays may be shown by placing a metallic ball, *A*, fig. 5, heated below redness, in the focus of a concave mirror, *B C*, and the

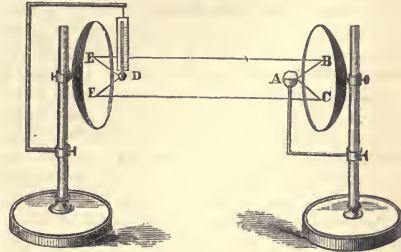


FIG. 5.

bulb of a thermometer, *D*, in the focus of a mirror, *E F*, opposite and at a distance. The temperature indicated by the thermometer will approach that of the ball, but if either thermometer or ball is removed from its position, the temperature will fall. The following method was employed by Sir John Leslie to determine the heat-reflecting powers of different substances. The source of heat, which may be a cubical vessel filled with hot water, or

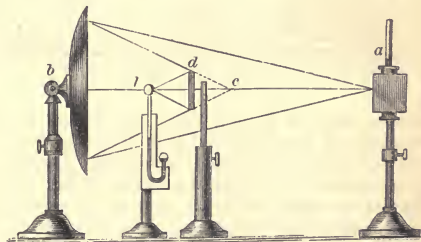


FIG. 6.

a metallic ball, *a*, fig. 6, is supported by a sliding standard at a distance in front of a concave metallic reflector at *b*. The focus of the mirror is at *c* for the divergent rays which come from the source of heat, but a reflecting plate *d* reflects them to *l*, where the focus is really formed. It is obvious that the heat at the focus *l* will be in proportion to the reflecting power of the plate *d*. By using plates of different materials he ascertained their reflecting power. Calling polished brass 100, he obtained the following results:

Brass	100	Lead	60
Silver.....	90	Amalgamated tin.....	10
Tin.....	80	Glass.....	10
Steel.....	70	Lampblack	0

This shows that the metals which are the best reflectors of light are also the best reflectors of heat. Moreover, when it is remembered that white light, which contains all the rays of the

solar spectrum (those of dark heat, those of luminous heat, and those of actinism), is reflected from polished surfaces without any decomposition, we have another proof of the fact that the laws of reflection are the same for each. The reflecting power also of a surface for heat and for light is found by experiment to be the same, allowance being made for errors; and the reflecting power of different substances varies with the angle of incidence in the same degree for heat as for light. In glass it increases rapidly with the angle of incidence, while in metals it increases slowly. It is also found that heat is diffused and scattered by the same surfaces in the same proportion that light is. II. CONDUCTION OF HEAT. If a copper rod, fig. 7, is placed on supports and a flame applied at one end, heat will flow along it toward the other end, and the rate may be measured by thermometers having their bulbs placed in cup-shaped holes containing mercury along the upper side of the bar. This was the method of, Despretz, who made the first important series of experiments on the subject.

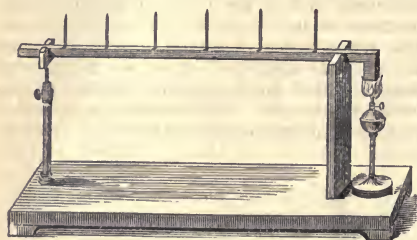


Fig. 7.

If an iron bar is substituted for the copper, the rate of flow will be much less, and a bar of platinum will be found a poorer conductor than one of iron. But the results of Despretz have been found by the later experiments of Wiedemann and Franz not to be perfectly accurate. The results obtained by these investigators are given in the following table, which also gives the electric conductions of the same metals, according to Riess and Lenz, these being very nearly the same as for heat, a fact which was first shown by Forbes:

RATES OF THERMAL AND ELECTRIC CONDUCTIVITY.

METALS.	THERMAL CONDUCTIVITY.	ELECTRIC CONDUCTIVITY.	
	Wiedemann and Franz.	Riess.	Lenz.
Silver.....	100.0	100.0	100.0
Copper.....	73.6	66.7	73.3
Gold.....	53.2	59.0	58.5
Brass.....	23.6	18.4	21.5
Tin.....	14.5	10.0	22.6
Iron.....	11.9	12.0	13.0
Lead.....	8.5	7.0	10.7
Platinum.....	6.4	10.5	10.3
Bismuth.....	1.8	....	1.9

One of the sources of error in Despretz's experiments was the employment of the holes

in the bar containing mercury, and another, a want of sensitiveness in the thermometer. Wiedemann and Franz used smooth rods, and measured the temperature with a thermo-electric pile and galvanometer. Marble and mineral substances generally are poorer conductors than any of the metals, and porcelain and glass are still poorer. The property of the thermal conductivity of metals is the basis of the invention of Davy's safety lamp for miners. (See LAMP.) The unequal conductivity of metals and other bodies is the cause of an interesting phenomenon, which is beautifully exhibited by what is known as Trevelyan's experiment, but which had been previously observed when a hot metal of good conducting power was laid against a cold one, a comparatively poor conductor, particularly if it had considerable expansion, as a copper brazing iron laid upon a block of cold lead. When the heated metal can readily acquire a slight rocking motion, the experiment succeeds the best. Trevelyan's apparatus consists of a "rocker" made of brass, having a longitudinal groove, and lying upon the cylindrical surface of a block of lead. When the rocker is heated and placed upon the lead, the ridges on each side of the groove are alternately thrown upward by the expansion in those parts of the surface of the lead which are heated by coming in contact with the hot brass, and thus a series of vibrations having a musical tone is produced. The reason why the heated metal should be a good conductor is that its surface may be kept hot uniformly with the mass, and thus be in a condition to impart sufficient heat to the surface of the lead at every moment. The advantage of employing lead as the other metal consists in its being capable of considerable expansion by heat, and in its being a poor conductor, so that in a moment the superficial portions may acquire enough heat to cause the requisite expansion to throw the rocker into vibrations. The same effect may be produced if, instead of a block of lead, one of stone is covered with a thin sheet of metal which is a good conductor, the condition required being one favorable to the rapid expansion of the surface, as was shown by Faraday. Other materials besides metals may be used, as various rocks and minerals.—Liquids are almost non-conductors of heat, as may be shown by pouring a small quantity of alcohol upon the surface of water in a tumbler and igniting it; a long time will elapse before the upper layers of the water become sensibly heated. Despretz employed an apparatus which consisted of a cylindrical wooden vessel about 3 ft. in height and 8 or 10 in. in diameter, which was filled with water. Through the sides of the cylinder 12 thermometers were placed, with their bulbs one above another in the axis of the column of water. A metal box, which was kept filled with water at 212° F., rested upon the top of the column of water. In this manner he found that the conductivity of heat for liquids follows

the same law as for solids, but is much more feeble, the conductivity of water being only about $\frac{1}{25}$ that of copper. Liquids are readily heated by convection. When heat is applied beneath vessels containing them, the stratum next the bottom expands by heat, and in rising



FIG. 8.

the particles communicate their excess of heat to those through which they pass. Gases become heated in the same manner; they are exceedingly bad conductors, but from the mobility of their particles it is difficult to arrive at satisfactory results as to their conducting power. Porous substances containing confined air are bad conductors of heat, wherefore the walls of well built dwellings intended to exclude the heat of summer and the cold of winter are divided into partitions containing confined air. Plaster of Paris, on account of its porosity after setting with water, and its non-combustibility, is used for filling between the plates of fire-proof safes; and the efficiency of porous garments in protecting the body against cold and heat is a matter of common observation. There is a remarkable exception to the non-conductivity of gases

in the case of hydrogen, which, although the lightest of all of them, is by comparison far the best conductor of heat. This is proved by the following experiment: If a fine platinum wire is passed through a glass tube, as shown in fig. 8, and its two ends placed in connection with the poles of a galvanic battery, it will become incandescent on the passage of a moderate galvanic current, if air or any gas besides hydrogen is passed through the tube, though not to the same degree as in a vacuum; but if hydrogen gas is passed through the tube, the incandescence disappears in consequence of the heat being conducted away. III. SPECIFIC HEAT. The first important experiments upon the specific heat of bodies were made by Dr. Black in the latter part of the 18th century, and the idea of measuring specific heat originated with him. If two equal measures of water are placed in separate vessels of the same material, all being at the same temperature, and there is immersed in one an iron ball of a certain weight, and of a temperature higher than that of the water, and in the other a quantity of mercury of equal weight and temperature, after a time each of the vessels with their contents will have come to an equilibrium; but it will be found that the contents of the vessel in which the iron was placed have a higher temperature than the other, showing that the iron has communicated to the water a greater quantity of heat than the mercury. If the iron ball and the mercury had been colder than the water, on

the attainment of equilibrium the water containing the iron would have been colder than that which contained the mercury. The amount which a body is thus capable of imparting or absorbing while rising or falling through a certain range of temperature is called its specific heat. The term first used to denote this property was "capacity for heat," and was introduced by Irvine, a pupil of Dr. Black. The term specific heat, according to Whewell, was proposed by Wilcke, a Swedish chemist, and according to others by Gadolin, of Abo, in 1784. If, in the experiment just mentioned, instead of an iron ball, an equal weight of water at the same temperature had been used, the quantity of heat imparted to the water already in the vessel would have been very much greater. If equal weights of water at different temperatures are mingled, the resulting temperature will be a mean between the two; but when equal weights of iron and water at different temperatures are placed together, the resulting temperature will be nearer that of the water. In making experiments in specific heat, it is necessary to adopt some unit of measure, of which several are employed. The gramme degree (centigrade) is the quantity of heat required to raise one gramme of water 1° C.; the kilogramme degree, sometimes called a calorie, is the heat required to raise one kilogramme of water 1° C.; and the pound degree is the amount required to raise one pound avoirdupois of water 1° F. or C. Three methods have been employed for determining specific heat: 1, the method of fusion of ice; 2, the method of mixtures; and 3, the method of cooling. 1. *The method of fusion of ice.* This was employed by Black, and simply consisted in making a deep cavity in a block of ice, fig. 9, placing the substance to be experimented on in it, and closing the cavity with a cover of ice. The substance is raised to a certain temperature, then introduced, and when cooled to zero is removed, and both it and the cavity wiped with a cloth of known weight; the increase in weight shows how much of the ice has been melted. Now, as will be seen further on, it requires as much heat to convert a pound of ice at 32° to a pound of water at 32° , as it does to raise a pound of water from 32° to 174° ; therefore water at 32°

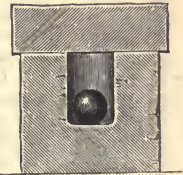


FIG. 9.—Black's Ice-block Calorimeter.

contains 142° more heat than ice at the same temperature. Let m denote the weight of water derived from the ice in the above experiment, w the weight of the body under experiment, s its specific heat, and t the number of degrees it has fallen; then there will result the following equation: $w t s = 142m$; or $s = \frac{142m}{wt}$, from which formula the specific heat

of any substance is readily ascertained. A modification of this apparatus, which gave more accurate results, was devised by Lavoisier and Laplace, and called an ice calorimeter, of which fig. 10 shows a perspective and a sectional view. It consists of three concentric

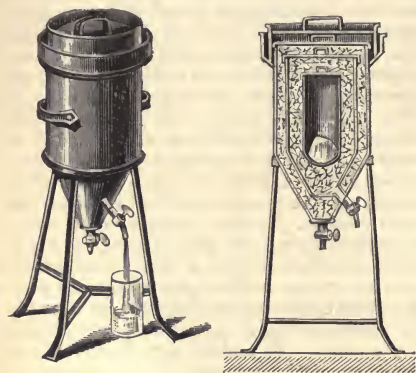


FIG. 10.—Ice Calorimeter.

tin vessels, the inner one for holding the body under experiment, while the two others contain pounded ice, that in the outer one to prevent external influence, that in the middle one to measure the heat given by the body under experiment. Stopcocks are supplied to each, that connected with the middle vessel being for the purpose of drawing off the water which has been produced by the action of the experimental body.

The manner of conducting the experiment is similar to that employed with the block of ice. The principal source of error is the difficulty of estimating the quantity of ice which has melted, as more or less water will adhere to the lumps. Bunsen has devised a calorimeter especially adapted to cases in which only small quantities are experimented upon. A test tube, *a*, fig. 11, which receives the substance to be tested, is fixed in the larger leg of a wide U-shaped tube, *b c*, the part *b*, containing the test tube, being filled with water, and the rest with mercury. A graduated smaller tube, *d*, open at the top, is adjusted to the top of the leg *c*, for the purpose of noting the rise or fall of the mercury in this



FIG. 11.—Bunsen's Calorimeter.

leg, which it is obvious will be effected by the expansion or contraction of the contents of the leg *b*. In making the experiment, *a* is surrounded by a freezing mixture and the water frozen. Then the substance under experiment is raised to a certain temperature and placed

in the test tube; it melts a certain quantity of ice, and thereby causes a diminution in volume of the contents of *b*, and consequently a fall of the mercury in *c*, and also in the graduated tube *d*. In this way the weight of ice melted may be estimated, and the weight and temperature of the tested substance being known, the specific heat may be readily calculated according to the formula which has been given. 2. *The method of mixtures.* An outline of this method was given in defining specific heat; it will now be applied in making determinations. A body is weighed and raised to a certain temperature, and then placed in a vessel containing cold water whose weight and temperature are also known. Let *m* be the weight of the body, *n* its temperature, and *s* its specific heat; also let *w* be the weight of cold water, and *t* its temperature. After a time equilibrium is obtained, when the temperature may be represented by *e*. The quantity of heat which the body has lost will therefore be *m s (n - e)*, and that which has been gained by the water will be *w (e - t)*, the specific heat of water being unity. Now, as the quantity of heat which is absorbed is equal to that which is given out by the body under experiment, *m s (n - e) = w (e - t)*, from whence $s = \frac{w (e - t)}{m (n - e)}$. To apply this

formula, suppose that three ounces of mercury at 212° is mixed with one ounce of water at 32° , and that the resulting temperature is 48.2° , what is the specific heat of mercury? In this example *m* = 3, *e* = 48.2° , and *n* - *e* = 163.8° ; therefore $s = \frac{48.2 - 32}{3 \times 163.8} = \frac{16.2}{491.4} = .033$, the specific heat of mercury, which is therefore only about $\frac{1}{30}$ that of water. In accurate experiments corrections are required for errors, one of which is caused by the absorption of a small amount of heat by the containing vessel. Regnault devised a method of mixtures, using a calorimeter capable of yielding more accurate results, and the elaborate experiments which were made by him have been of great value in the arts; but the method given above sufficiently illustrates the principles involved. 3. *The method of cooling.* Equal weights of bodies having different specific heats will cool through different degrees of temperature in the same time, the body having the least specific heat cooling the most rapidly. If two thermometers with blackened bulbs and of the same size are filled, one with mercury and the other with water, and then, at a common temperature, are placed in cool enclosures of the same construction and temperature, the mercurial thermometer will cool more than twice as rapidly as the one of water, the proportion being 30 to 13, because the specific heat of water is 30 times that of mercury, while the specific gravity of mercury is 13 times that of water.—*Specific Heat of Solids.* It was found by Dulong and Petit that the specific heat of a solid is greater at a high

than at a low temperature. Their results are shown in the following table:

MEAN SPECIFIC HEAT OF SOLIDS.

SUBSTANCES.	Between 32° and 212° F.	Between 32° and 572° F.
Iron.....	0.1098	0.1213
Mercury.....	0.0830	0.0850
Zinc.....	0.0927	0.1015
Antimony.....	0.0507	0.0549
Silver.....	0.0557	0.0611
Copper.....	0.0949	0.1018
Platinum.....	0.0855	0.0855
Glass.....	0.1770	0.1990

In the above table it may be seen that the specific heat of all the substances is greater at high than at low temperature, except that of platinum, which remains the same within the limits of the experiment. The reason given for this is that the melting point of platinum is very high, far higher than that of cast iron, and Regnault has found that the increase in its specific heat becomes more rapid as it approaches its melting point. Pouillet, by the method of mixtures, obtained the specific heat of platinum at higher temperatures than those employed by Dulong and Petit, but still very far below the melting point. The following are his results, which differ somewhat from those of Dulong and Petit:

MEAN SPECIFIC HEAT OF PLATINUM.

Between 32° and 212° F.....	0.0835
" 32 " 572	0.0843
" 32 " 932	0.0852
" 32 " 1292	0.0860
" 32 " 1552	0.0873
" 32 " 2192	0.0882

Contrary to the results of Dulong and Petit, Pouillet found there was a variation between 32° and 572°, but it will be seen that they agree as to the increase of specific heat with increase of temperature. The specific heat of a solid depends upon its molecular conditions, which may be considerably changed by treatment, as by rate of cooling after fusion, by hammering, by compression, or by traction. An increase of density diminishes the specific heat, while expansion increases it; for which reason, probably, it increases with the temperature. The following table of specific heats of solids is by Regnault, the range being between 32° and 212° F.:

Substances.	Sp. heats.	Substances.	Sp. heats.
Animal charcoal.....	0.26035	Cobalt.....	0.10696
Wood charcoal.....	0.24111	Zinc.....	0.09555
Sulphur.....	0.20259	Copper.....	0.09515
Graphite.....	0.20187	Brass.....	0.09391
Glass.....	0.19768	Silver.....	0.05710
Phosphorus.....	0.18949	Tin.....	0.05628
Diamond.....	0.14087	Antimony.....	0.05077
Gray iron.....	0.12039	Mercury.....	0.09392
Steel.....	0.11750	Gold.....	0.09244
Iron.....	0.11397	Platinum.....	0.08244
Nickel.....	0.10563	Bismuth.....	0.08054

—*Specific Heat of Liquids.* The specific heat of liquids may be found by the method of cooling, by that of mixtures, or by the calorimeter of Lavoisier and Laplace, fig. 10, already de-

scribed. Regnault employed the following method: The liquid under experiment is placed in the reservoir *a*, fig. 12, and this is immersed in a vessel containing water at a certain temperature; a known temperature is therefore given to the liquid in the reservoir by agitating

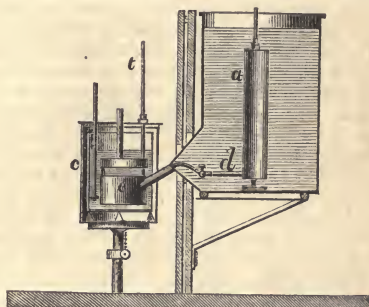


FIG. 12.—Regnault's Method for Liquids.

the water in the bath. The stopcock *d* is then opened, and the fluid is forced into the vessel *c*, contained in the calorimeter *c*. The water in the calorimeter, which is cooler than the fluid under experiment, has its temperature raised by the introduction of the latter. The increase is measured by the thermometer *t*, and from this, the weight of the water in the calorimeter and of the fluid under experiment being known, the specific heat of the latter is determined according to the method given above. Generally, a substance has a greater specific heat when in a liquid than when in a solid state, a fact first observed by Irvine. Thus, the specific heat of ice is only half that of water. The specific heat of liquids also increases with the temperature, but in a greater ratio than that of solids. The following results were obtained by Regnault with water:

MEAN SPECIFIC HEAT OF WATER.

From 32° to 104° F.....	1.0013
" 32 " 176	1.0085
" 32 " 245	1.0067
" 32 " 320	1.0109
" 32 " 392	1.0160
" 32 " 446	1.0204

It was formerly thought that water had a greater specific heat than any other liquid, but the researches of Dupré and Page indicate that the specific heat of a mixture of water and alcohol, containing 20 per cent. of the latter, is probably as high as 1.05.—*Specific Heat of Gases.* The specific heat of a gas at a constant volume differs from that at a constant pressure; in other words, it takes a greater amount of heat to raise a certain quantity of a gas through a certain number of degrees of temperature if it is allowed to expand than when it is confined. The specific heat under constant pressure exceeds that of constant volume by the amount which would be consumed in producing the expansion. The first important researches on the

specific heat of gases were those of Delaroché and Bérard. Their method consisted in passing known volumes of a gas under constant pressure and temperature through a spiral tube immersed in water, and making their calculations from the increase in its temperature. Regnault afterward made more exact experiments with a modification of the apparatus, from which he arrived at the following conclusions: 1. The specific heat of a given weight of a gas which is approximately perfect, or non-condensable, does not vary with the temperature of the gas. 2. The specific heat of a given weight of such a gas does not vary with the pressure or density, and therefore the specific heat of a given volume does vary in proportion to the density. 3. The specific heats of equal volumes of simple and uncondensable gases and of compound gases which are formed without condensation, such as hydrochloric acid and nitric oxide, are equal. 4. These laws do not hold for condensable gases, either simple or compound, as chlorine, bromine, or carbonic acid gas, the specific heat of which increases with the temperature.—*Specific Heat of Atoms.* Before treating of latent heat it will be convenient to consider the law of atomic heat, or the specific heat of atoms, which was discovered by Dulong and Petit in 1819, and which has rendered the knowledge of the specific heats of bodies of so much importance in chemical investigations. This law may be exactly enunciated as follows: The specific heats of elementary bodies are inversely proportional to their atomic weights; in other words, the product of the specific heat of any element into its atomic weight is constant. The following results verifying this law are due to Regnault; only a partial list is given:

ELEMENTS.	Sp. heat.	Atomic weight.	Product, or sp. heat of atoms.
Sulphur	0.1776	32	5.6832
Magnesium	0.2409	24	5.7976
Aluminium	0.2143	27.5	5.8932
Zinc	0.0955	65	6.2075
Cadmium	0.0576	112	6.4504
Cobalt	0.1070	58.5	6.2595
Nickel	0.1091	58.5	6.3823
Iron	0.1188	56	6.6328
Manganese	0.1140	55	6.2700
Copper	0.0951	63.5	6.0339
Silver	0.0570	108	6.1560
Gold	0.0324	196	6.3504
Antimony	0.0503	122	6.1976
Bismuth	0.0803	210	6.4650
Potassium	0.1096	39	6.6144
Sodium	0.2964	23	6.7432
Lithium	0.9408	7	6.5856
Lead	0.0314	207	6.4998
Platinum	0.0324	197	6.3828
Arsenic	0.0514	75	6.1050
Iodine	0.0541	127	6.8707
Bromine (solid)	0.0543	80	6.7740
Mercury (solid)	0.0319	200	6.3800

It will be observed that the products are not exactly the same, but there are the strongest reasons for believing that the variations are owing to differences in physical condition which are unavoidable under the circumstan-

ces in which the experiments are made. Assuming the theory to be correct, it follows that all elementary atoms, independent of their weight, have the same specific heat, and therefore that masses of elementary substances containing the same number of atoms and under the same physical conditions require the same amount of heat to raise them through an equal number of degrees. Thus, the atomic weight of iron being 56, and that of mercury 200, it will require the same amount of heat to raise 56 pounds of iron or 200 pounds of mercury through the same number of degrees. Neumann and Regnault have also found that the specific heats of all compound bodies of similar atomic composition are inversely proportional to their atomic weights. The following are Regnault's results with bichlorides:

SUBSTANCES.	Sp. heat.	At. weight.	Product.
Chloride of barium, BaCl ₂	0.0896	208	18.64
“ strontium, SrCl ₂	0.1199	158.5	19.00
“ calcium, CaCl ₂	0.1642	111	18.23
“ magnesium, MgCl ₂	0.1946	95	18.49
“ lead, PbCl ₂	0.0664	278	18.46
“ mercury, HgCl ₂	0.0689	271	18.67
“ zinc, ZnCl ₂	0.1862	136	18.52
“ tin, SnCl ₂	0.1016	189	19.20

The following results were obtained with carbonates:

SUBSTANCES.	Sp. heat.	At. weight.	Product.
Carbonate of lime, CaCO ₃	0.2086	100	20.86
“ barytes, BaCO ₃	0.1104	197	21.75
“ strontium, SrCO ₃	0.1445	147.5	21.32
“ iron, FeCO ₃	0.1984	116	22.43

It will be seen that the numbers in each table agree together more nearly than those of one with the other, but the close agreement in each group justifies the adoption of the law. IV. LATENT HEAT. The doctrine of latent heat was taught by Black in 1762. He was the first to observe that when a body passes from a solid to a liquid state a quantity of heat disappears. Thus, if ice at 32° has heat applied to it, and the resulting water as well as the ice is stirred, the temperature will remain at 32° until all the ice is melted. Thus, all the heat which has during this time been absorbed will have disappeared, and was said by Black and his contemporaries to have become latent. According to modern theory, this is not strictly true, unless we consider its conversion into another force a latent power which may be again reconverted into heat by the reversion of the water into ice. The energy which manifests itself in heat vibrations is expended in maintaining a different form, or performing a certain amount of internal work, as it is called.—*Latent Heat of Fusion.* If a pound of water at 212° is mixed with a pound of water at 32°, the resulting temperature will be a mean, viz., 122°; but if a pound of ice at 32° is mixed with a pound of water at 212°, the result will be two pounds of water at 51°.

There is thus a difference in the heat of the two mixtures of 71° , and since the temperature of one of the constituents in each mixture, viz., boiling water, was the same, this difference of 71° must represent the heat which is required to liquefy one pound of ice, and which is the same as that required to raise two pounds of water through a range of 71° , or one pound of water through 142° , or 142 pounds of water through 1° . If we take as a unit of heat that quantity which is necessary to raise one pound of water through 1° , the latent heat of water will be represented by 142 on Fahrenheit's scale, and by 78.88 on the centigrade scale. The experiment may be varied by mingling a pound of ice at 32° with a pound of water at 174° , when the resulting temperature on the fusion of the ice will be found to remain at 32° , showing as before the expenditure of 142° , which is the latent heat of water. According to the experiments of M. Person, the latent heat of water is more nearly 142.65° , or on the centigrade scale 79.25° . The following are his results with other liquids, calling the latent heat of water a thermal unit:

TABLE OF LATENT HEATS.

SUBSTANCES.	W=1.	In deg. F.	In deg. C.
Water.....	1.000	142.650	79.250
Phosphorus.....	0.063	9.061	5.064
Sulphur.....	0.118	16.862	9.868
Nitrate of soda.....	0.794	118.355	62.975
Nitrate of potash....	0.598	85.268	47.871
Tin.....	0.179	25.658	14.252
Bismuth.....	0.159	22.752	12.640
Lead.....	0.067	9.664	5.869
Zinc.....	0.355	52.434	28.180
Cadmium.....	0.172	24.588	18.660
Silver.....	0.266	37.926	21.070
Mercury.....	0.035	5.094	2.880

—*Latent Heat of Vaporization.* Liquids in passing into a state of vapor absorb a vast amount of heat. The conversion into vapor may be rapid, as in boiling, or it may be slow, as when water evaporates in the open air at common temperatures. In either case disappearance of heat in proportion to the quantity evaporated is the result. If a flask of cold water is placed over a lamp, the temperature will continue to rise until it reaches 212° F., when ebullition will commence; but the temperature will remain at 212° until the water has all boiled away. If the water at the commencement of the operation is at 32° , and the supply of heat is uniform, the time occupied in evaporating it will be about $5\frac{1}{2}$ times that which is occupied in raising it to the boiling point, although the temperature has not risen above 212° ; therefore $5\frac{1}{2}$ times as much heat is absorbed in evaporating a given quantity of water as in raising it through 180° . The latent heat of steam is therefore about $5\frac{1}{2}$ times 180° , or 990° F. If the steam is reconverted to the liquid form, precisely this amount of heat reappears; in other words, the energy into which the heat was converted to maintain a state of vapor is reconverted into heat when

the steam is reconverted into water. This is shown in the method of Despretz for determining the latent heat of vapors, which consists in condensing them in a worm immersed in water, and estimating the quantity of heat imparted to the latter. The retort C, fig. 13, heated by

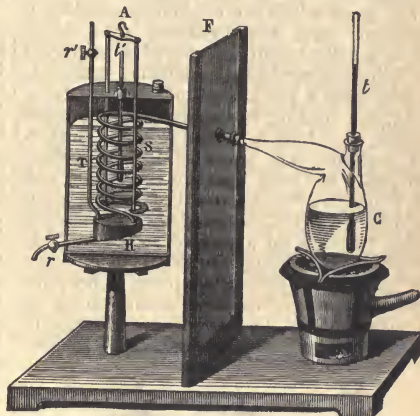


Fig. 13.—Despretz's Apparatus for Latent Heat of Vaporization.

a lamp, contains the liquid whose vapor is the subject of experiment. The vapor in passing through the worm S is condensed, imparting its latent heat to the water in the vessel R, and being collected in a vessel placed under the stopcock r, its weight can be found; and that of R, or the calorimeter, and its contents being known, and also their temperature, the increase of the latter furnishes the data for cal-



Fig. 14.—Faraday's Apparatus for Liquefying Gases.

culating the latent heat of the vapor. Regnault used more elaborate apparatus, and his results were rather more exact. If pressure is applied to a gas confined in an enclosure, its temperature will be raised, and if the pressure is immediately removed, the gas will return to

the temperature it had before compression; but if, while under compression, it is allowed to cool to its previous temperature, and the pressure is then removed, it will fall through as many degrees as it had been raised by compression. Upon the principle here involved, gases which were formerly considered permanent have been reduced to a liquid and to a solid condition. Faraday employed the following method: Introducing materials for producing a gas in one end of a bent tube, fig. 14, and heating it previous to their combination, and then applying a gentle heat, a vast pressure was produced by the generated gases, and then by placing the other end of the tube in a freezing mixture, condensation was effected. Thilorier in 1834 constructed on this principle an apparatus which was capable of liquefying large quantities of carbonic acid gas. The operation requires a pressure of about 50 atmospheres, or about 700 lbs. to the square inch. The vessels were formerly made of cast iron, strengthened with wrought-

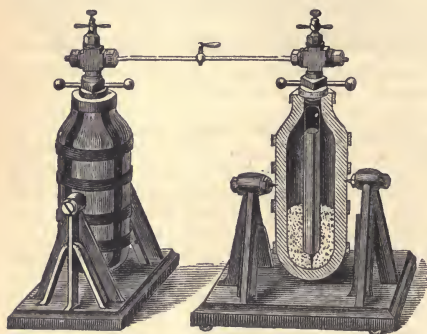


FIG. 15.—Thilorier's Apparatus for Liquefying Carbonic Acid.

iron hoops; but explosions occurring, attended with loss of life, the construction was modified by using leaden vessels surrounded with copper ones, bound with strong iron hoops. The apparatus is represented in fig. 15, and consists of two vessels, one a condenser and the other a generator, the latter being represented in section. Bicarbonate of soda is placed in the generator, and also a cylindrical vessel containing sulphuric acid. The generator being supported by pivots, it can be turned to spill the acid. The resulting gas, evolved in large quantities, is forced through the connecting tube into the condenser, which is surrounded by a freezing mixture, and is there condensed into a liquid. When some of the liquefied gas is allowed to escape into the air, a portion expands into gas, which so chills the remainder that it solidifies and forms white flakes, like snow, its temperature being about -129° F.; and if this is mixed with ether, the cold which is produced is so intense as to have an effect upon the skin like that of burning with hot iron. By placing this mixture in

the exhausted receiver of an air pump, Faraday caused the temperature to fall to 166° below zero; and M. Natterer by the use of a bath of nitrous oxide and bisulphide of carbon, previously liquefied by cold and pressure, lowered the temperature to 220° below zero; and Despretz succeeded in reducing alcohol to a viscous state. Liquid carbonic acid contained in a tube and placed in this mixture instantly becomes solid, assuming the appearance of transparent ice. By the use of this mixture and very high pressure, Andrews reduced air to $\frac{1}{15}$ of its original volume, oxygen to $\frac{1}{11}$, hydrogen to $\frac{1}{10}$, carbonic oxide to $\frac{1}{8}$, and nitric acid to $\frac{1}{6}$, but without producing liquefaction. There was some departure from Mariotte's and Boyle's law (see ATMOSPHERE), but it was less in hydrogen and carbonic oxide than in the other gases. Freezing on a large scale by Carré's apparatus, described in the article FREEZING, is effected on the principle of absorption of heat by evaporation and expansion. The absorption of heat by liquefaction has a familiar example in the ordinary freezing mixture of snow or pounded ice and common salt, by which the zero temperature of Fahrenheit's thermometer was obtained.—An interesting experiment in the absorption of heat by liquefaction and its reappearance on solidification is made by dissolving sulphate of soda in water. The two being mingled at the same temperature, the thermometer will indicate a fall. If the solution is warmed and saturated, and then allowed to cool while perfectly at rest, a point will be reached at which more of the soda will remain in solution than could have been dissolved at the same temperature. The polar relations of the molecules of the salt by which solution is maintained require, in order that solidification may take place, to be disturbed by a further reduction of temperature or by a mechanical impulse. The condition of solution is maintained by an expenditure of energy which when solidification or crystallization takes place resumes the condition or motion of heat. Agitation of the vessel, or of its contents by dropping among them a crystal of the salt, will cause crystallization to commence; and the bulb of a thermometer plunged into the mass will show a rise of temperature.—Prof. James Thomson, in a paper published in the "Transactions of the Royal Society of Edinburgh" in 1849, expressed his opinion, deduced from the mechanical theory of heat, that a liquid which expands in solidifying, like water, must have its melting point lowered by increase of pressure. Sir William Thomson soon after tested the question by experiment, and proved the correctness of the deduction. When a mixture of ice and water was subjected to pressure, the temperature fell, returning again to 32° when the pressure was removed. The addition of pressures of 8.1 and 16.8 atmospheres lowered the freezing point 0.106° and 0.232° F. respectively; results which very

nearly agree with Prof. James Thomson's prediction that the fall should be 0.0135° for each additional atmosphere. Mouton has since then succeeded by enormous pressure in reducing the freezing point of water several degrees. The apparatus in which pressure was effected was placed in a certain position and charged with water into which a piece of metal was dropped. The water was then frozen, and cooled to zero, or 32° below the freezing point. A pressure which was estimated to be several thousand atmospheres was then applied, after which the apparatus was inverted and the pressure removed, when on examination the piece of metal was found at the opposite side of the enclosure, thus showing that the ice had been melted. Those bodies which, unlike ice, expand during liquefaction, have their melting points raised instead of lowered by increase of pressure. In this manner Bunsen, Hopkins, and Fairbairn have raised the melting point of spermaceti, which is 120° , several degrees; a pressure of 519 atmospheres raised it to 140° , and one of 792 atmospheres to 176° . A liquid which, like water, expands on congealing, has its particles restrained by pressure, and therefore to congeal it the temperature must be lowered; but one which contracts in solidifying will have its particles assisted by pressure, and hence its melting point will be raised.—Many interesting phenomena are exhibited by liquids and gases when subjected to great heat and pressure, such as the obliteration of the line of demarkation between the liquid and vaporized portion in which what is called a critical temperature is concerned. The subject will be found treated, with that of the tension of vapors, in the article VAPORIZATION. Chemical action being always accompanied by physical change, as expansion or contraction, liquefaction or solidification, it is difficult to estimate the effects produced by each. In general it may be held that the heat of chemical combination results from the intense molecular motion imparted by the clashing of combining molecules with each other, and moreover, that whatever heat is evolved by combination will be absorbed, or will disappear in the separation of the constituents of the compound into their original form; and it is found that generally combination produces heat, and that decomposition produces cold. But the heat which is evolved by the physical changes which accompany chemical action is more easily accounted for. Take for example the condensation which accompanies the union of quicklime with water; the resulting hydrate has less bulk than the sum of the constituents previous to combination. The energy necessary to maintain this excess of volume among particles at insensible distances from each other composing liquids or solids, is enormous; consequently a reduction of the distances, whether accomplished by the influence of chemical affinity or by mechanical pressure, causes a conversion of this energy

into another, generally heat. The first change may not, however, be entirely into heat, but, as in the case of the compression of certain crystals, or the combination of a metal with an acid under certain conditions, as in the galvanic battery, there may be a transformation into electric force, but which is supposed finally to become resolved into heat. Sir William Thomson has advanced the opinion that there is a tendency to the conversion of all physical energy into the condition of heat, and to its uniform diffusion throughout all matter; a condition which he regards as involving the cessation of all physical phenomena. The conclusions of Prof. Thomson are founded upon the law of the French philosopher Carnot, which is that mechanical energy is produced by heat only when it is transferred from a body of a higher to one of a lower temperature. The subject is a difficult one, as there are many possible circumstances connected with the forces and matter of the universe which can never be reduced to an exact basis of calculation.—The following are the most important recent works on heat: "Sketch of Thermodynamics," by P. G. Tait (Edinburgh, 1868); "An Elementary Treatise on Heat," by Balfour Stewart (London, 1872); "Theory of Heat," by J. Clerk Maxwell (1871); "Heat as a Mode of Motion," and "Contributions to Molecular Physics in the Domain of Radiant Heat," by John Tyndall (1873). See also the articles "Heat" and "Radiation" in Watts's "Dictionary of Chemistry," and various articles in the reports of the Smithsonian institution.

HEATH, or **Heather**, the common name of plants of the genus *Erica*, which contains about 400 species, besides numerous varieties produced by cultivation. The greater number of species of heath are natives of western Africa, some are peculiar to the western portion of Europe and the Mediterranean, and a few extend into northern Europe, one of which is sparingly found in North America. While some of the African species form shrubs 8 or 10 ft. high, those of northern countries are low, much-branched shrubs, seldom exceeding a foot. The small evergreen leaves are entire, usually revolute at the margins and in whorls of three or four, scattered or rarely opposite. The mostly drooping flowers are either axillary or in short terminal clusters; the calyx of four sepals, sometimes colored; corolla ovoid, globular, bell-shaped, or sometimes tubular, more or less four-lobed, and drying attached to the capsule; stamens eight, the anthers with two appendages at the back and opening by a chink; pistil solitary; capsule four-celled, splitting at maturity into four or eight valves. The genus *Erica* comprises species of great beauty, even the most humble of them being attractive, and is the type of a large order, the *Ericaceae* or the heath family, noted for the showy character of many of its genera, about 50 in number, including *rhododendron*, *azalea*, *kalmia*, *andromeda*, and others well known for the beauty of

their flowers and highly prized as ornamental plants. *Erica* is the ancient name of a plant, probably of this genus; the Anglo-Saxon name heath is also applied to localities where the plant grows. Six species of heath are found in Great Britain, some of them covering tracts many miles in extent; heaths are so abundant, and so often form an important feature in the landscape, that allusions to heath and heather are frequent in prose and poetry. The species found in this country is the commonest of those of Great Britain; it is also known as ling, and is the most widely distributed of all heaths. A few years ago American botanists were greatly excited by the announcement that the heath, a plant heretofore unknown to our flora, had been found growing wild at Tewksbury, Mass. Many visited the locality, and for a while the question whether the Tewksbury heath was indigenous or an escape from cultivation was warmly discussed in scientific and other journals. Subsequent discoveries of the plant in Maine, and its occurrence in Nova Scotia and elsewhere in the British provinces, leave no doubt that the heath is a native of the American continent. This plant was named *erica vulgaris* by Linnaeus, and many botanists still retain this name, while others call it *calluna vulgaris*. Its leaves, instead of being whorled as in the other heaths, are opposite; its deeply lobed corolla is shorter than the calyx; and these characters, together with the more important one, a different structure in the capsule, would seem sufficient to separate it from the ericas and entitle it to rank as a genus to which the name *calluna* (Gr. *καλλινεύειν*, to sweep) was given by Salisbury. The common



Common Heath (*Erica vulgaris*).

heath is of slow growth and has strong, slender stems; in some unusual locations specimens 3 or 4 ft. high are found, but upon the scanty soil of the moors it is seldom above a foot. When nothing else can be obtained, cattle and sheep browse upon the herbage of the heath;

but it is not nutritious, and being powerfully astringent it unfavorably affects the health of the animals. Those who live where heath is abundant make it useful for various purposes; the branches are employed for thatching hovels and making wattled fences, and are even twisted into ropes; they also serve for making baskets and brushes of various kinds, a fact which suggested the generic name. Small fagots of heath stems are imported into this country in considerable quantities, and sold for scrubbing kitchen utensils and similar uses. The common heath frequently varies, and some of its forms are recognized as named varieties; the flowers are generally rose-colored, but they are found pure white and deep purplish red; there is a



Scotch Heath (*Erica cinerea*).

form with variegated foliage, another with double flowers, and several others are found in European gardens. This and the Mediterranean heath, *erica carnea*, with its variety *herbacea*, are quite hardy near the city of New York; and probably the Scotch heath, *E. cinerea*, the Cornish heath, *E. vagans*, and other northern species, would endure our extremes of temperature. These plants are deserving of more attention than they have yet received from cultivators in this country; their low and compact growth adapt them to form beds by themselves, or to serve as an edging to borders containing other plants. The Mediterranean heath blooms in early spring, while the common species opens its flowers at a time of scarcity of bloom, July and August. The greenhouse species and varieties, usually known as Cape heaths, are almost innumerable; they possess delicacy and beauty of habit, which united with great freedom of flowering render them valuable for decorative purposes. The flowers are wonderfully diversified in form and tint, and will reward the care required to produce them in perfection. They are comparatively neglected in this country, but in England, where the climate is especially favorable, much attention is given to their cultivation, especial houses being frequently devoted to heaths alone. Their roots, being exceedingly fine and thread-like, demand great care in providing them with a proper soil and in supplying them with water.

HEATH, William, a major general in the American revolution, born in Roxbury, Mass., March 7, 1737, died there, Jan. 24, 1814. When the Massachusetts congress in 1774

voted to enroll 12,000 minute men, volunteers from among the militia, Heath, then a farmer in Roxbury, was commissioned as one of the generals. On June 22, 1775, he was appointed brigadier in the continental army, and in August, 1776, became major general. When the troops moved to New York, Heath was stationed in the highlands near King's Bridge. In 1777 he was transferred to Boston, and the prisoners of Saratoga were intrusted to him. In June, 1779, he was again at the highlands, with four regiments, and he was stationed near the Hudson till the close of the war. He was the last surviving major general of the revolutionary army, and published "Memoirs of Maj. Gen. Heath, containing Anecdotes, Details of Skirmishes, Battles, &c., during the American War" (1798).

HEATHFIELD, Lord. See **ELIOTT, GEORGE AUGUSTUS.**

HEBBEL, Friedrich, a German lyric and dramatic poet, born at Wesselburen, Holstein, March 18, 1813, died in Vienna, Dec. 13, 1863. He was the son of a farmer, was educated at Heidelberg, and went to Hamburg, where in 1841 he wrote his tragedy of *Judith*, which was immediately successful. He then visited Copenhagen, Paris, London, and Naples, and in 1846 settled in Vienna, where he married the actress Christine Enghaus. Among his other dramas are *Genoëva* (1843), *Maria Magdalena* (1844), *Der Diamant* (1847), *Herodes* and *Mariamne* (1850), *Julia* (1851), *Michel Angelo* (1855), and *Die Nibelungen* (2 vols., 1862). A complete edition of his works was issued at Hamburg in 12 vols., 1865-'8. They are characterized by boldness, vigor, and originality, with a predilection for the horrible.

HEBE (Gr. ἥβη, youth), in mythology, the goddess of youth, a daughter of Jupiter and Juno. She served her fellow divinities with nectar at their festivals, assisted her mother in putting the horses to her chariot, and bathed and dressed her brother Mars. She is said to have been married to Hercules after his apotheosis, and to have been the mother of two sons by him.

HEBEL, Johann Peter, a German poet, born in Basel, May 11, 1760, died at Schwetzingen, Sept. 22, 1826. He studied at Erlangen, and in 1791 was appointed professor in the gymnasium of Carlsruhe. He became in 1805 church counsellor, and in 1819 prelate. His works include *Allemannische Gedichte*, written in a Swabian sub-dialect (11th ed., Aarau, 1860), of which there are five High German translations; *Die biblischen Geschichten* (2 vols., 2d ed., Stuttgart, 1824); *Der rheinländische Hausfreund* (3d ed., 1827); and *Schatzkästlein des rheinischen Hausfreundes* (last ed., 1850). His complete works were issued in 8 vols. in 1832-'4; new edition, 1871 *et seq.*

HEBER. I. Reginald, an English bishop, born in Malpas, Cheshire, April 21, 1783, died in Trichinopoly, India, April 3, 1826. At the age of seven he had translated Phædrus into

English verse. In 1800 he entered Brasenose college, Oxford, and his *Carmen Seculare* obtained the first prize for Latin verse. In 1803 he wrote his prize poem "Palestine," which is still considered the best of the kind produced at Oxford. He graduated in 1804, and in 1805 gained the bachelor's prize for an essay on the "Sense of Honor." In 1807 he took orders, and was presented by his brother Richard to a living at Hodnet in Shropshire, on which he settled in 1809, immediately after his marriage with the daughter of Dr. Shipley, dean of St. Asaph. He devoted himself to the relief of the sick and the poor, and gave his leisure to literature, frequently contributing to the "Quarterly Review," and composing hymns. His "Poems and Translations" (London, 1812) contains many original hymns written to particular tunes; some of these are at once the most popular and the most artistic in the language. Heber commenced a dictionary of the Bible, which he was compelled by other duties to relinquish, and in 1819-'22 edited the works of Jeremy Taylor, with a copious life of the author, and a critical examination of his writings. In 1822 he was appointed preacher at Lincoln's Inn, and in 1823 was consecrated bishop of Calcutta, a see which at that time embraced all British India, Ceylon, Mauritius, and Australia. He started for Calcutta in June, 1823, and 12 months later entered upon the visitation of his vast diocese. From that time until his death he was occupied with the duties of his office, making long journeys to Bombay, Madras, and Ceylon, and showing great energy and capacity. He died of apoplexy. His "Narrative of a Journey through the Upper Provinces of India, from Calcutta to Bombay" (2 vols. 4to, London, 1828), was posthumous. In 1827 his hymns were first published entire in a volume entitled "Hymns written and adapted to the Service of the Church," of which many subsequent editions have appeared. The latest edition of his complete poems, including his "Palestine," is that of 1855 (8vo, London). The Bampton lectures entitled "The Personality and Office of the Christian Comforter" (8vo, Oxford, 1813) were his only sermons published during his life. Several volumes of his sermons delivered in England and India were published posthumously, and in 1830 appeared the "Life and Unpublished Works of Reginald Heber, by his Widow" (2 vols. 4to, London). **II. Richard**, a bibliomaniac, half brother of the preceding, born in Westminster in 1773, died in October, 1833. He was educated at Brasenose college, Oxford. At 19 he edited the works of Silius Italicus (2 vols. 12mo, 1792), and a year later prepared for the press an edition of *Claudian's Carmina* (2 vols., 1793). A taste for book collecting was developed in him in childhood, and in the latter part of his life it became a ruling passion. Succeeding on the death of his father in 1804 to large estates in Yorkshire and Shropshire, which he consider-

ably augmented, he forthwith devoted himself to the purchase of rare books. After ransacking England he travelled extensively on the continent, purchasing everywhere, and leaving large depots of books in Paris, Antwerp, Brussels, Ghent, and elsewhere in the Netherlands and Germany. His residence in Pimlico, London, was filled with books from top to bottom, and he had another house in York street laden with literary treasures, and a large library in Oxford. At his death his collection in England was estimated by Dr. Dibdin at 105,000 volumes, exclusive of many thousands on the continent, the whole having cost upward of £180,000. Allibone in his "Dictionary of Authors" computes the volumes in England at 113,195, and those in France and Holland at 33,632, making a total of 146,827, to which must be added a large collection of pamphlets. This immense library was disposed of by auction after the owner's death, the sale lasting 216 days and realizing more than £60,000. Heber was elected to parliament for the university of Oxford in 1821, and served till 1826.

HÉBERT, Antoine Auguste Ernest, a French artist, born at Grenoble, Nov. 3, 1817. He went to Paris in 1835 to study law, but soon devoted himself to painting. In 1839 he exhibited his "Tasso in Prison," which was bought by the government for the Grenoble museum, and "The Cup found in Benjamin's Sack," to which was awarded the great prize which gave him the right to go to Rome for five years at the expense of the government. He continued eight years in Italy, and made much reputation by his "Malaria," exhibited in 1850, representing an Italian family flying from the pestilence. He obtained first class medals in 1851 and 1855; and in 1866 he was appointed director of the academy of France at Rome.

HÉBERT, Jacques René, a French revolutionist, known also under the assumed name of **PÈRE DUCHESNE**, born in Alençon in 1755, executed in Paris, March 24, 1794. Of low parentage and education, he went when very young to Paris, where he led an obscure life, generally supporting himself by dishonest means. When the revolution broke out he took to pamphlet writing, and soon established a scurrilous newspaper called *Le Père Duchesne*, which had considerable popularity among the lowest classes, and was instrumental in exciting several insurrectionary movements. After Aug. 10, 1792, he was one of the most active members of the self-constituted revolutionary commune, and received the appointment of substitute to the *procureur syndic*. The Girondists having obtained from the convention an order for his arrest, he was liberated in consequence of a violent outbreak of the mob, and became more popular than ever. He was a member of the commission to examine Marie Antoinette, and uttered the most outrageous calumnies against her. In conjunction with Chaumette, Anacharsis Clootz, and others, he established the worship of the "goddess Reason;" and,

relying upon the support of the commune and the club of Cordeliers, organized the ultra-revolutionist party known as the Hébertists or *enragés*. The committee of public safety, controlled by Robespierre, had them arraigned by virtue of a decree of the convention; and on the night of March 13, 1794, Hébert, Chaumette, Montmore, Ronsin, Clootz, and 14 others, were conveyed to prison. Hébert evinced great cowardice on his trial, and was executed amid the jeers of the populace. The circulation of his paper had been immense. During the year 1793 he received from the government 180,000 francs for copies gratuitously distributed. He published several pamphlets of a similar character to his journal, *Les vitres cassées, Catéchisme, Cantique séculaire, Almanach*, &c., all of them signed "Le Père Duchesne."

HEBREWS, Israelites, or Jews (Heb. *'Ibrim, Benei Yisrael, Yehudim*), a people of Semitic race, whose ancestors appear at the very dawn of history on the banks of the Euphrates, Jordan, and Nile, and whose fragments are now to be seen in almost every city of the globe. Their history is the history of a nation, of a religion, and of a literature, and must thus exceptionally be treated. For its chief characteristic is the intimate blending and joint working of the national and religious elements in the development and preservation of the people; and Hebrew literature is almost entirely national or religious. The opening event of this history, as recorded in Scriptures, is the emigration (about 2000 B. C.) of the Semite Abraham from Ur of the Chaldees. (See **CHALDEA**.) He was by his father Terah a descendant of Eber, and as such may have borne the name *Ibri* (Hebrew), but more likely he was first designated by it in the land west of the Euphrates, as an immigrant from beyond (*'eber*) the "great river." The name Israelite was applied to his descendants after a surname of Jacob, his grandson, and that of *Yehudim* (Jews) at a much later period (first mentioned about 712 B. C.), when, after the dispersion of the ten tribes, the house of Judah became the representative of the whole people. Separating from his relatives, who were idolaters, Abraham passed over from Mesopotamia (Aram Naharaim) to Canaan or Palestine, where he lived the life of a nomad, being rich in herds, flocks, and attendants, and worshipping the "Creator of heaven and earth," to whose service, "to walk before him and to be innocent," he bound himself and his house, in after life, by the covenant of circumcision. Having repaired to Egypt during a famine and returned, he rescued his nephew Lot, who lived in the valley of the lower Jordan, from the captivity of Amraphel, a king of Shinar, and his allies; lived for some time in the land of the Philistines; and finally settled near Hebron, where he died, leaving his main inheritance and his faith to Isaac, his son by his relative Sarah. Isaac thus became the second Hebrew patriarch, while his brother Ishmael, the son of Ha-

gar, an Egyptian woman, sought a separate abode in Arabia. Of the two sons of Isaac, only Jacob (afterward Israel), the favorite of their mother Rebecca, imitated the peaceful and pious life of his fathers and propagated the Hebrew line in Palestine, while his brother Esau (or Edom) settled in the mountainous land of Seir (Idumæa). Jacob had 12 sons, of whom he distinguished Joseph, the child of his favorite wife Rachel. This excited the envy of the others, who secretly sold their brother as a slave to Egypt, where he rose through his wisdom to the dignity of prime minister to one of the Pharaohs. The latter allowed him to bring the whole family of his father, numbering 70 males, over from the land of Canaan, and to settle them in the province of Goshen (E. of the Pelusiac branch of the Nile, it is supposed), where they could continue their pastoral life, unmolested by the Egyptians, who held that mode of existence in great contempt, and where they would be uncontaminated by Egyptian idolatry. Jacob closed his life, having adopted the two sons of Joseph, Manasseh and Ephraim, for his own. The book of Genesis, the only record of that earliest period of Hebrew history, closing with the death of Jacob and Joseph, also contains the last blessing of the former, a specimen of the most ancient Hebrew poetry. After the death of Joseph the Hebrews were not only oppressed but degraded to the condition of slaves, were overtasked and employed in the public works, while the fear of their joining a foreign enemy finally led one of their tyrants to decree what may be called their slow extermination, they having in the mean while increased to a prodigious number. How long they remained in the "house of slaves" (for the Hebrews were not the only slaves in Egypt) cannot be determined, there being Scriptural testimony for 430, as well as for about 210 years; nor can the precise date of their arrival, which Bunsen endeavors to fix almost 1,000 years earlier than it is fixed by Scriptural chronology; nor of their exodus, which, according to some of the most celebrated Egyptological critics, took place about 1300 B. C., while according to a distinct Biblical passage (1 Kings vi. 1) it must have happened early in the 15th century. (See *EXODUS*.) Nor is it easier or more important to find the reigns during which these events took place. (See *EGYPT*, and *EXODUS*.) Some writers have attempted to identify the Hebrews with the Hyksos, which is little less absurd than the fables of Manetho mentioned by Josephus. The last named Jewish historian has also some traditional additions to the early life of Moses, concerning his exploits in Ethiopia. Born at the time when the oppression of his people had been carried to its extreme, Moses, the younger son of Amram, a descendant of Levi, the third son of Jacob, was doomed to perish in the Nile with all new-born males of the Israelites, but was saved by the love of his mother Jochebed and his sister Miriam, and the compassion of a

daughter of the Pharaoh. Adopted as a son by the princess, who gave him his name, but nursed by his mother, he united the highest Egyptian education with the sentiments of a Hebrew. And "when Moses was grown he went out unto his brethren, and looked on their burdens." Seeing an Egyptian man smiting one of his brethren, he killed him, fled to Midian, married Zipporah, the daughter of Jethro, a wise priest or prince of that country, by whom he had two sons, and tended the flock of his father-in-law, leading it into the desert, as far as Mount Horeb, the N. E. eminence of Mount Sinai, in the S. part of the peninsula between the two gulfs of the Red sea. It was not till the decline of his life that he returned to Egypt to become the "shepherd of his people." He appeared with his brother Aaron, his spokesman, assembled the elders of Israel, and announced to them their approaching deliverance and return to Canaan in the name of the Everlasting (Hebrew, *Yehovah*, Being) and Unchangeable (*Ehyeh-asher-ehyeh*, I-am-that-I-am), the God of Abraham, Isaac, and Jacob, who "had seen their affliction." He now repaired to the palace of the king, proved superior to his priests, gained the admiration of his ministers and people (Exod. xi. 8), and finally compelled him to grant his demand by a series of disasters, the last of which was the sudden destruction at midnight of all the first-born Egyptians (possibly then a privileged class). The Israelites had received their secret instructions, and immediately departed toward the desert. Moses led them across the northern extremity of the gulf of Akabah or Suez, the western prolongation of the Red sea (Heb. *Yam Suf*, reedy sea); and the king of Egypt, who, repenting of having let them go, pursued them with his cavalry and heavy war chariots, perished there with his army. The "song of Moses," which celebrates this event (Exod. xv.), is an admirable monument of ancient Hebrew poetry, though surpassed in grandeur by that which closes the narrative of his life (Deut. xxxii.). After having repulsed an attack of the Amalekites, a roving and predatory Arabian tribe, Moses led the people to Mount Sinai, which from the delivery of the ten commandments now received the name of the mountain of God. This divine decalogue not only contained the common fundamental points of every moral and legal code ("Honor thy father and mother," "Thou shalt not murder," &c.), but also included the sublime doctrine of monotheism, the great social institution of the sabbath, and the lofty moral precept, "Thou shalt not covet." These commandments, which formed the basis of a "covenant between God and Israel," together with the successively promulgated statutes, precepts, &c. (according to the rabbis, altogether 365 positive and 248 negative obligations), constitute the Mosaic law (*Torath Mosheh*), which is contained principally in the second and third, and repeated in the fifth book of the Pentateuch, and for about 15 centuries

remained, and with the exception of a strictly national part still is, the general code of the Hebrews. Its aims are the moral perfection of the individual and the welfare of society. Its means are chiefly a common and central worship, under the direction of the Aaronites (*Kohanim*), whose restrictive obligations are, however, not equalled by the privileges they enjoy; three festivals for the commemoration of great national events, thanksgiving and rejoicing, as well as for the annual gathering of the whole people; a fast day for repentance; periodical readings of the law; general education through the Levites its guardians (Deut. xxxiii. 10); a weekly day of rest (sabbath) for the people and their animals; the seventh year as a periodical time of rest for the earth, as well as for the extinction of various pecuniary claims; numerous and most frequently repeated obligations for the support of the fatherless and widow, the poor and the stranger; an organized judiciary and police; a severe penal code; strict rules for the preservation of health and cleanliness; circumcision as a bodily mark of the covenant; and numerous other rites and ceremonies designed to guard the nationality, or to lead to the preservation of truths and principles. The chief principles are: self-sanctification and righteousness, in imitation of God, who is holy and righteous (Lev. xix. 2, &c.); brotherly love and equality, for all people are his children (Deut. xiv. 1); freedom, for all are bound exclusively to his service (Lev. xxv. 55); limited right of property, for the whole land belongs to him (Lev. xxv. 23). The principal promise of reward is the natural share of the individual in the happiness of society; the principal threat of celestial punishment, his natural share in its misfortunes. The form of government is the republicanism (though a limited monarchy may be established if the people demand it), with the moral theocratic dictatorship of a prophet (*nabî*) like the lawgiver, with the sovereignty of the people who judge the merits and claims of the prophet above it, and above all the majesty of the divine law, which can be explained and developed, but not altered. The whole system is entirely practical, containing no definitions of supernatural things, except in a negative form, no articles of belief, no formulas of prayer. —But the difficulties of introducing this system of institutions were as immense as those of maintaining the nation in the desert. The first census showed 22,000 male Levites above one year of age, and 603,550 males of other tribes over 20, including 22,273 first born. Provisions were scanty, water was scarce, dangers were constant; the people were an unruly mass of freed slaves, who often regretfully thought of the flesh pots of Egypt and of the quiet carelessness of bondage; a multitude of non-Israelites who had joined them regretted the visible gods of their former worship; envy and ambition often augmented the existing dissatisfaction. Moses was still on Mount Sinai when

the people compelled his brother Aaron to give them, in a golden calf, an imitation of the Egyptian Apis, a visible god. Moses, descending, broke the tablets of the covenant in his anger, and restored order by a massacre of the idolatrous rioters, but almost despaired of his mission and desired to die. A pompous worship was now introduced, and sacrifices were ordained, of which a later prophet, Jeremiah (vii. 22), significantly says in the name of God: "For I spake not unto your fathers, nor commanded them in the day that I brought them out of the land of Egypt, concerning burnt offerings or sacrifices." Moses removed his tent from the camp. All difficulties, however, were conquered by the "man of God," who consoled himself with the idea that a generation educated under his guidance would replace that of the desert. Having passed around the lands of the Edomites, Moabites, and Ammonites, he conquered those of Sihon, king of the Amorites, and of Og, king of Bashan (Batanaa), E. of the Jordan, giving them to the tribes of Reuben and Gad and to half the tribe of Manasseh, and died on Mount Nebo before entering the land of promise. The man who was "meek above all men that were on the face of the earth" died in voluntary loneliness, and "no man knoweth of his sepulchre unto this day." Joshua, his pupil and appointed successor, an Ephraimite, now led the 13 tribes of Israel, named after 11 sons of Jacob and the two sons of Joseph, across the Jordan into Canaan (or Palestine proper), which was conquered after a war of extermination, and allotted to the tribes of Judah, Ephraim, Manasseh (the other half), Benjamin, Simeon, Zebulun, Issachar, Asher, Naphtali, and Dan. The Levites, who were to live by tithes, received no separate division, but a number of cities within the limits of every tribe, among others the historical places of Gibeon, Geba, Beth-horon, Mahanaim, Heshbon, Jazer, Hebron, Shechem, Golan, Kedesh, and Ramoth-Gilead; of which the last five together with Bezer were selected as towns of refuge for involuntary murderers, while Shiloh became the central city, receiving the tabernacle with the ark of the covenant. Phinehas, son of Eleazar, the zealous priest, and Caleb, son of Jephunneh, were among the most distinguished assistants of Joshua. Before his death, Joshua held an assembly of the whole nation at Shechem, in which he called upon them to choose once more between the gods of their ancestors beyond the Euphrates, those of the conquered Amorites, and the God whom he was determined to follow with his house. The people chose their Deliverer and Preserver, and confirmed their choice by a new covenant; but scarcely were the elders gone who had witnessed the whole work of deliverance and maintained the order of Joshua, when idolatry and anarchy became general. Parts of the country remained unconquered, principally in the hands of the Phœnicians in the N. W., of the Philistines in the S. W., and of the Jebusites

in the centre. With these, and with other neighbors on the borders, frequent warfare had to be waged, while the young state, forming a loose confederacy of 12 (or, counting Manasseh as two, of 13) almost independent members, had neither natural boundaries nor a capital, neither a hereditary head nor an elective federal government, the only bond of union being the common law, and the only centre the seat of the ark of the covenant, whose guardians probably enjoyed the privilege of convoking a general assembly of the people in cases of urgent necessity. Such national assemblies were often held at Mizpah. But the enmity and frequent attacks of the surrounding idolatrous tribes was less pernicious than their friendly relations in times of peace, when the voluptuous rites connected with the worship of Ashtoreth and other divinities of the Phœnicians, Syrians, and Philistines, were too seductive for a people in an undeveloped state, whose own religion required a rigid observance of a strict morality. To remedy these evils, heroic men arose from time to time, repulsed the enemies, restored order and the law, were acknowledged as leaders and judges, at least by a part of the people, and thus revived its unity. This period of republican federalism under judges (*shophetim*, a name which also designated the chief magistrates of the Carthaginians in their language, which was also Semitic) is described in the book of that name, a continuation of that of Joshua, and forms one of the most interesting portions of Hebrew history. But criticism labors in vain to arrange chronologically the striking but in part probably contemporaneous events of the narrative. Othniel, a younger brother or nephew of Caleb, of the tribe of Judah, was the first of the judges. Ehud, a Benjamite, delivered Israel from the oppression of the Moabites, having killed with his own left hand Eglon, the king of the invaders. "And after him was Shamgar, the son of Anath, who slew of the Philistines 600 men with an ox goad," at a time when "no shield was seen or a spear among 40,000 in Israel." Barak, a Naphtalite, inspired by Deborah, a female prophet and judge, who afterward celebrated the event in her great song (Judges v.), gained together with her a signal victory near Mount Tabor and the brook Kishon over the army of Sisera, commander of Jabin, a Canaanite king on the N. of Palestine, which numbered 900 iron war chariots. Sisera fled, but was killed in sleep by Jael, a woman of the nomadic and neutral Kenite tribe, in whose tent he had sought refuge. Gideon, characterized as the youngest son of one of the weakest families in Manasseh, surprised with 300 select men the immense camp of the Midianites and Amalekites, dispersed them, called the surrounding tribes to arms, exterminated the invaders, appeased the Ephraimites, who were jealous of the glory gained by their neighbors, and refused to accept the royal dignity offered him by the gratitude of the people, declaring,

"I will not rule over you, neither shall my son rule over you: the Lord shall rule over you." Abimelech, however, his son by a concubine, gained adherents among the idolatrous friends of his mother in Shechem, destroyed the numerous family of his father, was proclaimed king in that city, was afterward expelled, but reconquered the city, and finally perished while besieging the tower of the neighboring Thebez by a piece of millstone cast from its top by a woman. Jotham, the only son of Jerubbaal (as Gideon was called from his destruction of the Baal worship) who escaped from the massacre of his brothers, had predicted the bloody end of the usurper in his fable of "the trees that went forth to anoint a king over them" (Judges ix.), which is probably the most ancient specimen of that kind of poetry now extant. Of the judges Tola, of the tribe of Issachar, and Jair, from Gilead in Manasseh beyond the Jordan, little more is preserved than their names. Jephthah, another Gileadite, of illegitimate birth, having been expelled from his home, was recalled by his native district to combat against the Ammonites, who had attacked it, carried the war into the land of the enemy, and returned after a signal victory, of which his daughter, in consequence of a vow, became a victim. The Ephraimites, who had not been called to participate in the combat, now threatened vengeance on the conqueror, who, unlike Gideon, terminated the quarrel with a bloody defeat of the troublesome tribe, which is the first example of civil war among the Israelites, soon to be followed by others. Ibzan of Bethlehem in Judah, Elon, a Zebulunite, and Abdon, an Ephraimite, are next briefly mentioned as judges. Dan, too, gave Israel a judge in the person of Samson, who braved and humiliated the Philistines; he was a Nazarite of prodigious strength, whose adventurous exploits in life and death much resemble those of the legendary heroes of Greece. The greatest anarchy now prevailed. The Danites not having yet conquered their territory, 600 men among them made an independent expedition north, and conquered a peaceful town of the Phœnicians, Laish, which was by them named Dan, and is henceforth mentioned as the northernmost town of the whole country, the opposite southern point being Beersheba. The concubine of a Levite having been outraged to death on a passage through Gibeah in Benjamin by some inhabitants of that place, her lover cut her corpse into pieces and sent them to all the tribes, calling for vengeance. The people assembled at Mizpah, and demanded from Benjamin the surrender of the criminals. The Benjamites refused, and a bloody civil war ensued, in which they were nearly exterminated. The people wept over their fratricidal victory, and 600 Benjamites who alone survived were allowed to seize wives (for the victors had sworn not to give them any) from among the girls dancing in the valley of Shiloh, on a sacred festival annually celebrated there. The little book

of Ruth, which contains the idyllic narrative of the Moabitish widow of that name, who, faithfully sharing the fate of her unfortunate mother-in-law, adopted her Hebrew home and religion, and married Boaz, is supplementary to the book of Judges. The first book of Samuel begins with the continuation of the latter. The priest Eli, who died suddenly on receiving the news of the defeat of his people by the Philistines, the death of his two sons, and the capture of the ark of the covenant, and his pupil, the prophet or seer Samuel, the son of Elkanah and the pious Hannah, were the last of the judges. The latter reestablished the exclusive worship of the Lord, routed the Philistines, restored the ark, and introduced schools of prophets, residing in Ramah, his native place, and regularly visiting Bethel, Gilgal, and Mizpah; and when he finally resigned the executive power, he could say to the assembled people at Gilgal, "Behold, here I am; witness against me before the Lord: Whose ox have I taken? or whose ass have I taken? or whom have I defrauded? whom have I oppressed? or of whose hand have I received any bribe to blind mine eyes therewith?" And the people testified to the purity of his career. But his sons, whom he appointed in his old age, acted very differently, and their corruption, but still more the desire for a strong military head, so natural after the previous long period of war, anarchy, and disunion, finally decided the people to urge the appointment of a king to rule them "like all other nations." The seer, deeply grieved by the proposed change of the Mosaic form of government, which is distinctly branded in the narrative as a repudiation of the divine rule itself, in vain painted to the people all the oppression, extortion, and degradation inseparable from monarchical rule (1 Sam. viii.); they persisted in their demand, and he was obliged to yield. Saul, the son of Kish, was appointed the first king of Israel, and the constitution of the monarchy (1 Sam. x. 25) was written and deposited in the sanctuary. The new rule was strengthened and became popular by a series of victories over the Ammonites, Moabites, Idumeans, Syrians, and Philistines. The eldest son of the king, Jonathan, distinguished himself as a heroic youth. Abner, a cousin of Saul, became commander of the army. Gibeah was the capital of the monarchy. But an expedition against the Amalekites, though successful, was not executed according to the ordinance of Samuel, who now turned his influence against Saul. The spirit of the latter became troubled, and David, the son of Jesse of Bethlehem, was brought to soothe his temper with music. This young shepherd excited the jealousy of Saul by his triumph over Goliath, the Philistine giant, which decided a campaign, as well as by his subsequent successes when he married the princess Michal, and became the intimate friend of her brother Jonathan. Foreseeing the future destinies of the aspiring youth, Saul repeatedly attempted

to take his life, and, exasperated by his failures, and the protection bestowed on David by his children, Samuel, and the priests, he exterminated the inhabitants of Nob, a city of the latter, and passed his life in pursuit of his rival, who, with a band of desperate outlaws roving on the southern borders of the country, baffled every attempt to capture him. The extermination of wizardship was one of the acts of Saul. His reign was terminated by a catastrophe. A battle was fought against the Philistines at Mount Gilboa; the Hebrews fled, Jonathan and two other sons of Saul fell, and the king slew himself with his own sword. David, whose skill in poetry equalled his musical genius, honored in a touching elegy the memory of his fallen friend and foe (2 Sam. i.), who, "lovely and pleasant in their lives, were even in their death not divided: they were swifter than eagles, they were stronger than lions." Repairing to Hebron, he was anointed there by his own tribe of Judah as king, while Abner proclaimed a surviving son of Saul, Ishbosheth, at Mahanaim, who was acknowledged by all the other tribes (about 1055 B. C.). Bloody conflicts stained this double reign, David continually gaining the ascendancy through his heroic officers, the brothers Joab, Abisai, and Asahel, until the assassination of Abner and soon after of Ishbosheth, caused by private revenge, gave him the whole kingdom. He now conquered Zion from the Jebusites, made Jerusalem his capital, organized the national worship as well as the military power of the state, and by continual victories over all surrounding neighbors, except Phœnicia, a friendly country, extended the limits of his dominions N. E. as far as the Euphrates, and S. W. as far as the Red sea. Justice was strictly administered; literature and arts, especially poetry and music, flourished. Asaph, the founder of a family of sacred singers, rivalled the king in psalms; Nathan and Gad assisted him as prophets, Zadok and Abiathar as priests; Joab held almost continually the chief command of the army. But the palace of the king was often stained with crimes; David himself had much to repent of; the infamous deeds of his sons by various wives, Amnon, Absalom, and Adonijah, distracted the peace of his house and kingdom, and the two former had perished, and two great insurrections had been quelled, when he died after a reign of 40 years (about 1015). Solomon, his son (by Bathsheba, the widow of the assassinated patriot Uriah), ascended the throne at the age of twelve, and commenced his reign with the execution of his half brother Adonijah and the aged Joab, who had conspired against his succession; but he soon became famous for personal wisdom and scientific attainments, as well as for the splendor of his court and the prosperity of his subjects. He inherited a large army and a full treasury, but he used the former only to preserve peace and secure tribute from his neighbors, and the lat-

ter for the adornment of his country by numerous gorgeous public structures. He built the temple, which more than all contributed to his glory, and a royal palace (both in Jerusalem and with the assistance of Tyrian architects), an armory, Palmyra (Tadmor) in the desert, and other cities; made common naval expeditions with the king of Tyre, from Ezion-geber, a port on the eastern gulf of the Red sea, to the distant land of Ophir, which brought back gold, gems, precious woods, and rare animals; imported horses from Egypt for his numerous cavalry and war chariots; and introduced general luxury. The fame of his wisdom attracted visitors, among them the queen of Sheba (Saba) in southern Arabia. The authorship of 3,000 proverbs and 1,005 songs is mentioned among his literary merits; for he wrote "of beasts, of fowl, of creeping things, and of fishes," and of all kinds of plants from the cedar in Lebanon to the hyssop on the wall; and the extant philosophical book of Proverbs and the graceful Song of Songs (the latter of which, however, criticism assigns to a much later period) bear his name. But, while he was teaching wisdom in writings, his personal example taught extravagance and folly. His court was as corrupt as it was splendid. The magnificence which he exhibited was not exclusively the product of foreign gold, tribute, and presents, but in part based on the taxes of his subjects. The army served not only to secure peace, but also as a tool of oppression. The public structures were built with the sweat of the people. Near the national temple on Mount Moriah, altars and mounds were erected for the worship of Ashtoreth, Moloch, and other idols, introduced by some of his numberless wives from their native countries, Phœnicia, the land of Ammon, Idumæa, and Egypt. Rezon was suffered to establish a hostile dynasty in Damascus, and Hadad to make himself independent in Idumæa. When Solomon died, after a peaceful reign of 40 years, the people felt themselves so exhausted that they demanded a considerable change from his son Rehoboam before they proclaimed him king at Shechem, where they had assembled for the purpose. Jeroboam, an Ephraimite who had already attempted an insurrection against the late king, now returned from his exile in Egypt and headed a deputation of the most distinguished citizens. Rehoboam promised an answer after three days. The experienced councillors of his father advised him to yield for the moment in order to be master for life; but the advice of his younger companions better suited his disposition, and his reply to the people was accordingly: "My father made your yoke heavy, and I will add to your yoke; my father also chastised you with whips, but I will chastise you with scorpions." The consequence of this was an immediate defection of ten tribes, who proclaimed Jeroboam their king, while only Judah and Benjamin remained faithful to the

house of David. Rehoboam, having fled from Shechem, where his receiver general of taxes was stoned by the revolted people, returned to Jerusalem and assembled a powerful army to reconquer his lost dominions; but the prophet Shemaiah dissuaded the people in the name of God from the civil war. Thus the division of the state into two separate kingdoms was consummated (975). The northern, comprising the country N. of Benjamin and all E. of the Jordan, was called Israel, or, from its principal members, Ephraim and Manasseh, the house of Joseph, and poetically Ephraim; its capital was Shechem, subsequently Tirzah, and finally Samaria (Shomeron). The southern, from its chief tribe called Judah, had the advantage of possessing the sanctuary in the old capital, and being supported by the Levites and the priests, who gathered around it. To destroy the influence of the religious element upon his own subjects, who according to the Mosaic law were bound to repair three times in the year to the chosen sacred spot, Jeroboam revived the not yet extinct Egyptian superstitions of his people, established two golden calves as emblems of their divinity, at Dan and Bethel, on the N. and S. boundaries of his state, admitted non-Levites to the priestly office, and introduced new festivals and even a new calendar. The Mosaic institutions being thus systematically excluded from the state, idolatry, despotism, and corruption prevailed throughout the 250 years of its existence, almost without interruption. While these evils remained permanent, the condition of the people was made still worse by a continual change of masters. Usurpation followed usurpation; conspiracy, revolt, and regicide became common events. The house of Jeroboam was exterminated with his son Nadab by Baasha, who reigned at Tirzah, and whose son Elah was assassinated while drunk by Zimri, one of his generals. At the same time another of his officers, who commanded an army besieging Gibbethon, a city of the Philistines, was proclaimed king by his troops, marched upon Tirzah, and took it, and Zimri after a reign of seven days burned himself with his palace. A part of the people now wanted Tibni, but Omri prevailed, and Tibni died. Omri, who built Samaria and made it his capital, was succeeded by his son Ahab, whose wife Jezebel, a Sidonian princess, was fanatically zealous in propagating the worship of the Phœnician Baal, and in persecuting the prophets of monotheism, who were almost exterminated. Ahab having died of a wound received in the battle of Ramoth-Gilead against the Syrians under Benhadad II. (897), his two sons Abaziah and Jehoram successively reigned after him; but with the latter the idolatrous house of Omri was exterminated by Jehu, who was proclaimed king by the officers of the army which he commanded against Hazael of Syria in Gilead (884). Jehu, who had been anointed by the prophet Elisha, abolished the worship of Baal, but left the institutions of

Jeroboam. His dynasty, assisted by the influence of Elisha, was in many respects prosperous. To it belonged the kings Jehoahaz, Joash, Jeroboam II., and Zechariah, with whose murder by Shallum it ended (773). Shallum met with the same fate after a month through Menahem, whose son Pekahiah was slain and succeeded by his chariot driver Pekah. The murderer of the latter, Hoshea, was the last of the usurpers, and the last king of Israel. This state, which during all its existence was exposed to violent shocks from its neighbors, Judah, the Philistines, Moab, which revolted, and especially from the Syrians of Damascus, against whom its possessions beyond the Jordan could seldom be defended, had recovered some strength by repeated victories under Joash and Jeroboam II.; but soon after, rotten and decayed through idolatry, despotism, and anarchy, it became an easy prey to the growing power of Assyria, to whose king Phul it became tributary after an invasion in the reign of Menahem. Tiglath-pileser conquered its E. and N. provinces, carrying off the inhabitants to Assyria, in the time of Pekah, and Shalmaneser destroyed it entirely, conquering the capital, Samaria, after a siege of three years (721), taking Hoshea prisoner, and dispersing the inhabitants throughout the N. E. provinces of his empire, where their idolatrous habits made them likely to lose their nationality and soon to disappear among their neighbors, though scattered remnants may occasionally have emerged at later periods, and in various countries, as representatives of the ten tribes of Israel. The prophets Ahijah of Shiloh, who contributed to the election of Jeroboam I., Elijah, the hero of the Mosaic religion under Ahab, his great disciple Elisha, the two contemporaries of Jeroboam II., Amos and Hosea, Micah, who lived in the last period, and many others, strove in vain to check the growing power of evil by appeals to the conscience of rulers and people, boldly denouncing the despotism, hypocrisy, and licentiousness of kings, princes, and priests, the selfishness, pride, and extravagance of the rich, the extortions, deceptions, and seductions practised on the people, and again and again kindling the spirit of justice, truth, patriotism, humility, or hope. The rival state of Judah enjoyed more frequent periods of prosperity and lawful order, as well as a longer duration. There the interest of the dynasty, which continued in a direct line of succession down to the latest period, was identical with that of the people. Their common enemy was the idolatry which reigned in Israel. Their common safeguard was the law, which was here supported by the Levites, and more effectively defended by the prophets. Corruption, however, often led both government and people to break down their only wall of protection, and to imitate the pernicious example of their neighbors. This tendency prevailed as early as the reign of Rehoboam, the most important

event of which was the invasion of Shishak (Sheshonk), king of Egypt, who pillaged the temple and the royal palace. War against Jeroboam was almost continually waged during this and the following short reign of Abijam. The successor of the latter, Asa, abolished idolatry, checked public immorality, routed an invading army of Ethiopians, resisted the attacks of Baasha of Israel through an alliance with the king of Damascene Syria, and fortified Gibeah and Mizpah against an invasion from the north. Jehoshaphat, his son, made peace with Israel, and even fought in alliance with Ahab against Benhadad of Syria (897), subdued Idumæa, and fought successfully against the Moabites and their allies, but was unfortunate in an attempted expedition to Ophir. Internally, too, his reign was one of the most successful, the salutary reforms of his father being further developed. But his son Jehoram, having married Athaliah, a sister of Ahab, followed the example of the court of Samaria, and also lost his father's conquest, Idumæa, by a revolt. Ahaziah was equally attached to the house of Ahab, whose fate he shared. Having gone to visit Jehoram, he was mortally wounded by the conspirators under Jehu, and expired on his flight at Megiddo (884). On receiving news of that event, Athaliah his mother usurped the government, exterminating all the royal princes except one, Joash, a child of one year, who was saved by his aunt and secreted in the temple. Six years later Jehoiaha, an old priest, matured a conspiracy, the legal heir to the house of David was produced in the temple, and the queen, who hastened thither, was slain. The altars of Baal were now destroyed, and the temple was repaired under the influence of Jehoiaha; but an invasion of Hazael from Syria could not be repulsed, and the capital itself was saved only by an immense ransom. After the death of Jehoiaha Joash abandoned his teachings, and even the son of his benefactor, Zechariah, who boldly reprimanded him, fell a victim to his tyranny, which was ended with his life by a conspiracy (838). His successor Amaziah punished the murderers of his father, and made a successful expedition to Idumæa, but was made prisoner in a battle against Joash, king of Israel, which he had wantonly provoked by a challenge, and, having returned after the death of that king to his conquered and unfortified capital, was deprived by a conspiracy of his throne and life. The following reign of Uzziah or Azariah was not only one of the longest in the history of the Hebrews, lasting 52 years, but also distinguished by victories over the Philistines, Arabians, and Ammonites, and by the flourishing condition of husbandry, mechanical arts, and literature. Besides Amos and Hosea, who were active also in Judah, Jonah and Joel were among the prophets of that period. Of the last we still possess a beautiful poetical description of a dreadful devastation by locusts, perhaps alle-

gorically of barbarians, when "the land was as the garden of Eden before them, and behind them a desolate wilderness." Another destructive event was a long remembered earthquake. Jotham, the son of Uzziah, who during the last years of his reign acted as regent, continued after his father's death (759) his beneficent rule; but his son Ahaz again introduced idolatry, and his reign was disgraceful and disastrous. Rezin and Pekah, allied against him, advanced as far as Jerusalem, which was saved only by the dearly purchased aid of Tiglath-pileser, king of Assyria, who conquered Damascus, carried its inhabitants into captivity, and slew Rezin. Ahaz declared himself the subject of his Assyrian deliverer, and also suffered attacks by the revolted Philistines, while the state of the interior of the country provoked the immortal denunciations of Isaiah and Micah. But these prophets express in no less glowing words their hopes of a better future, which seemed to be realized in the succeeding reign of Hezekiah the son of Ahaz. This pious king followed almost entirely the injunctions of Isaiah, who was bold enough to advise an uncompromising abolition of ancient abuses and restoration of the Mosaic law, war against the Philistines, independence of Assyria, and at the same time the rejection of any alliance with Egypt; and was powerful enough to brave the general corruption, to baffle the plots of the court, and to maintain the courage of the people as well as of the sick king during the great invasion of Sennacherib, when the state was on the brink of ruin. Thus Judah escaped the fate of her sister state, which had a few years before been conquered and devastated by the Assyrians, and which now began to be repopulated principally by Cuthæans, an idolatrous people subject to their rule, who, mingling their rites with those of their new territory about Samaria, became afterward known under the name of Samaritans (*Kuthim*), while scattered portions of the ancient Hebrew inhabitants augmented the number of the subjects of Hezekiah. But the reign of his son Manasseh, longer than that of Uzziah, was more disgraceful than that of Ahaz. Idolatry was not only publicly introduced, but had its altars even on Mount Moriah. The most abominable practices prevailed, including the bloody worship of Moloch, and Jerusalem was filled with the blood of the innocent victims of tyranny, while the limits of the country were narrowed by hostile neighbors. Amon, the son of Manasseh, followed in his father's footsteps, but was murdered after two years. Josiah, his successor, however, was a zealous imitator of Hezekiah, and was assisted in his radical reforms by the reviving influence of the prophets, among whom were Nahum, Zephaniah, the young Jeremiah, and their female colleague Huldah. Nahum celebrated the final fall of Assyria, and the destruction of Nineveh its capital, "the bloody city full of lies and robbery, (whence) the prey

departeth not," which was then completed by the allied Babylonians and Medes. But the power of Babylonia, lately founded by Nabopolassar, was now growing to a threatening extent, and the position of the weak kingdom of Judah between this and the rival power of Egypt doomed it to a sudden catastrophe. Pharaoh Necho having commenced a campaign against Babylonia through Philistia, Josiah opposed his march, and fell in the battle of Megiddo. His son Jehoahaz was sent prisoner to Egypt, and the younger Jehoiakim (or Eljakim) appointed king in his stead. The great victory of the Babylonians, however, over Necho on the Euphrates, soon made Jehoiakim a vassal of their empire. He afterward revolted, against the advice of Jeremiah, who saw the impossibility of resisting the sway of Nebuchadnezzar, the successor of Nabopolassar. The king was as little inclined to listen to his council in his foreign as he was in his domestic policy. Jeremiah's prophecies were burned. Another prophet, Uriah, was punished for the boldness of his rebukes with death. The Chaldeans soon invaded the country, and were joined by its neighboring enemies. After the death of his father and a short siege of Jerusalem, Jehoiachin or Jeconiah, the son of Jehoiakim, terminated the war by a voluntary surrender to Nebuchadnezzar, who sent him with his family, his army, and thousands of the most important citizens, to Babylonia as captives. The treasures of the temple and royal house were plundered. Mattaniah, an uncle of the dethroned king, was appointed his successor, as vassal of the conqueror, under the name of Zedekiah (598). It was the last reign of the house of David. Zedekiah, a weak prince, was induced by a misguided patriotism to revolt against Nebuchadnezzar. Jeremiah in vain exerted all his zeal and eloquence to dissuade the king and the people from this pernicious step. He was persecuted by both; the seductive influence of false prophets prevailed. The second siege of Jerusalem by Nebuchadnezzar now ensued (588). It fell after a desperate defence. The king, who attempted to escape with the remnants of his troops, was made prisoner in the neighborhood of Jericho, was deprived of his eyes after having seen the slaughter of his children, and was sent in chains to Babylon. The temple was burned, its vessels were plundered, the walls and palaces of Jerusalem destroyed, and all important or wealthy citizens carried into the Babylonish captivity. Jeremiah was spared and allowed to remain with Gedaliah, whom Nebuchadnezzar appointed his viceroy at Mizpah, and around whom a number of the remaining people soon gathered. But this last centre, too, was soon destroyed by the assassination of Gedaliah. A number of the surviving officers emigrated with their followers and Jeremiah, who tried in vain to dissuade them, to Egypt, whither the sword of the Chaldeans still followed them. The annihilation of the state of Judah was complete. The book

of Lamentations contains touching elegies on this tragic end. Ezekiel too laments the dispersion of his nation. Providence is arraigned by Habakkuk and Jeremiah, and also in the book of Job, a sublime lyrical drama, which numerous critics regard as a production of that time. A number of psalms, too, belong to the last period of the kingdom of Judah. But Babylonia, the prison of the Jewish nation (for this name had now become the most familiar), was destined also to become the cradle of its regeneration. The most eminent of the people had been transplanted there with Jeconiah, and afterward, among others, Ezekiel, Daniel, and his pious companions at the court of Nebuchadnezzar, Hananiah, Mishael, and Azariah; and their activity in reviving the spirit of religion and nationality is evident from the numerous contributions to the Hebrew literature of that period, all glowing with enthusiasm and unconquered hope. The court, that source of corruption, was no more; the priests of Baal and Moloch, so long fattened on lies, had disappeared with the altars of their idols; the voluptuous groves of Ashtoreth could not be transplanted into the land of dreary captivity; Zion was regrettably remembered, and the true admonishers of the people, who had predicted all this, now found more willing ears. Their consolations, too, and the deliverance which they promised, were soon to be confirmed; and the captives, who were full of revengeful hatred toward their oppressor, the profligate and treacherous mistress of the world, heard with secret delight of the warlike preparations of the Medo-Persian empire against her. The last ruler of Babylon, Belshazzar, was drinking wine with his lords, his wives, and his concubines, from the golden and silver vessels of the temple of Jerusalem, when "one messenger was running to meet another" to tell him "that his city was taken at one end" (538). The Persian conqueror did not disappoint those who had predicted, and perhaps secretly promoted, his triumph. He allowed the Jews to return to their country, where they could be useful by forming a kind of outpost against Egypt, and to rebuild their capital and temple. The first and largest body of returning patriots consisted of more than 42,000 persons, under the lead of Zerubbabel, a prince of the house of David, and the high priest Jeshua. But the idolatrous Samaritans, whom the Jews would not admit to have a share in the new temple, exerted themselves to prevent their rebuilding and fortifying Jerusalem, calumniating them at the court of Persia, particularly under Cambyes (529-522) and Pseudo-Smerdis (522). Darius, however, fully confirmed the permission of Cyrus (521). The prophets Haggai and Zechariah (assisted, perhaps, by Obadiah, who seems to have been their contemporary) inspired Zerubbabel, the priests, and the people with fresh zeal, and after five years the new temple was completed (516). The events which are described in the book of Esther—the elevation of the Jewess of that

name (or Hadassah) to the dignity of Persian queen, the high official career of her relative Mordecai, the schemes of Haman, a courtier and personal enemy of the latter, to destroy all the Jews of the Persian empire, his fall, and the almost miraculous escape of the people through Mordecai and Esther—probably refer to the reign of Xerxes (486-465), the son of Darius, though the name Ahasuerus is used in the Scriptures to designate various monarchs of the Persian empire. Under the following reign of Artaxerxes, Ezra, the pious scribe (or critic, *sopher*), led a new colony of Jews from beyond the Euphrates to Jerusalem, where he carried through a series of important reforms, completing the restoration of the Mosaic law, for which he was afterward revered as the second lawgiver of his people. The condition of the Jews in Palestine, however, or rather in Jerusalem and its vicinity, was not cheering. The city had no walls or gates, and poverty prevailed. To remedy these evils Nehemiah, the Jewish cup-bearer of Artaxerxes, started from Susa with the permission of the monarch and the dignity of governor (445). The work of restoring and fortifying Jerusalem was now carried on and executed with the utmost zeal, though the laborers were often obliged to work under arms, the Samaritans and their friends threatening an attack. Notwithstanding his dignity, Nehemiah voluntarily shared the toils and privations of his brethren. He restored order, assisted the poor, abolished the abuses of the rich, and strengthened the observance of the law. After a long absence at the royal court, during which fresh disorder had arisen, he resumed his pious and patriotic work, in which he was assisted by Malachi, the last of the known prophets. The enmity of the Samaritans, though baffled in its first assaults, remained active down to a much later period, their separation having been sanctioned by a rival temple on Mount Gerizim. The Jewish temple on Mount Moriah had a successive line of hereditary high priests in the direct descendants of Jeshua, of whom Jaddua held that most influential office at the time of the conquest of the Persian empire by Alexander, whose wrath he is said to have diverted from Jerusalem (332). The names of the Persian governors during the last century of that empire are unknown, this being altogether the most obscure period in the history of the Jews. It seems to have been a time of comparative tranquillity and prosperity; at least it included no particular national disaster, as it added no day of fasting to those recently established in commemoration of the fall of Jerusalem, the death of Gedaliah, &c. But the same century, together with the time of Ezra, may certainly be regarded as the period of the most important religious developments, of a permanent consolidation of Judaism. The first impulse had probably been given in Babylonia, during the active literary period of the captivity. But Ezra the *sopher*, his contemporaries Haggai, Zechariah, Nehe-

miah, and others, "the men of the great assembly" (*anshei keneseeth haggadolah*), and the successive *sopherim*, are the real authors of the restoration and the new developments connected with it. The sacred Scriptures were collected, authenticated, and arranged into a canon, including the most precious remnants of a vast literature, among the lost parts of which were the often mentioned and quoted *Sepher hayashar* (in the English version, "book of Jasher"), probably a collection of historical songs, the book of the "Wars of the Lord," the special "Chronicles" of the kings of Judah and Israel, the prophecies of Nathan, Ahijah, Iddo, and others, the "History of Solomon," various works of this king, and an endless multitude of others; their great number was complained of in the philosophical book of Ecclesiastes, a work commonly attributed to Solomon, but by numerous critics assigned to a very late period. The Pentateuch was publicly read, taught in schools, explained, hermeneutically expounded (*mid-rash*), and translated into the Chaldee language, which the common people had adopted in Babylonia, together with various eastern notions concerning angels, spirits, and other supernatural things. The legal or religious traditions, explanatory of or complementary to the law of Moses, were traced back through the prophets and elders to that lawgiver, and systematically established as the oral law (*torah* or *debarim shebbeat pek*). New obligations were added to form a kind of "fence" (*seyag*) around the law, preventing its infraction, and founded on the authority of the scholars and wise men of the age (*dibrei sopherim, mitzvath zekenim*). The following century and a half, when Judea was a province of the successors of Alexander in Egypt and Syria, the Ptolemies and Seleucids, is marked by new features. Greek refinement, science, and philosophy spread among the Jews, particularly among the flourishing colonies in Alexandria and other cities of the Ptolemies. A part of the people, especially the wealthier, adopted the Epicurean notions of the demoralized Greeks of that time, and were finally organized as a sect, denying the immortality of the soul, rejecting the authority of tradition, and adhering to the literal sense of the Mosaic law; while the teachings of the Stoics agreed well with the more austere life of the followers of the "great assembly," who maintained their preponderance with the people. As a sect the former were called Sadducees, the more ascetic of the latter Pharisees. The derivation of both these names is as little settled as is that of the name of the Essenes, who appear about the close of this period, forming secluded, industrious, and socialistic communities, and engaged in medical, mystical, and ascetic practices. The Samaritans, who, adopting in part the Mosaic rites, had succeeded in attaching to their temple a part of the neighboring Jews, now followed the example of the Hellenizing cities of Syria, and made little opposition to the spreading worship of the Greek gods. The

Greek language became common in Judea, and the Greek translation of the Pentateuch prepared under Ptolemy Philadelphus in Egypt (the Septuagint) was used in the synagogues of that country. A Syrian dialect of the Aramaic was used for the same purpose by the Samaritans, and the pure Chaldee prevailed among the Jews beyond the Euphrates. Politically, no less than in matters of religion, Judea seems to have been ruled by the high priests, who had to be confirmed by the Egyptian or Syrian kings, and the sanhedrim of Jerusalem, a college of 70, with a president (*beth din hagadol*, high court). After the death of Alexander (323), the little province frequently changed masters, until it was definitively attached to the empire of Ptolemy I. Soter, under whom the celebrated Simon the Just (or Righteous) officiated as high priest, and Antigonus of Socho as president of the sanhedrim. The uncertainty of possession made the foreign rulers more lenient. The country was growing in wealth and population, in spite of large colonies drawn to Alexandria by Alexander the Great, Soter, and others. These were particularly well treated, and enjoyed privileges which made them an object of envy. They, like their brethren of Babylonia and other countries of Asia, enriched Jerusalem and the temple by their gifts and visits during festivals. Ptolemy II. Philadelphus (285-247) was especially favorable to the Jews. Under his successors, however, Judea grew impatient of the Egyptian rule, and when Antiochus the Great attacked the young Ptolemy V., the Jews willingly aided him in driving the Egyptians from their land (198). They soon had reason to regret this change of dynasty. The Seleucids were bent on Hellenizing their empire, and were offended by the determination of the Jews to preserve their own national and religious peculiarities. The treasures, too, which had been slowly accumulated in the temple of Jerusalem, tempted their avarice, while they also augmented the number of priestly office-seekers. Tyranny and corruption growing together, the dignity of high priest was finally converted into an office for sale. One Onias was robbed of it for the benefit of his younger brother Jason, who offered 360 talents to the court of Syria; a third brother, Menelaus, wrested it from him, giving 300 more, and strove to maintain himself in his usurpation by scandalously promoting the arbitrary schemes of Antiochus Epiphanes. Being driven from the city by Jason and his followers, and besieged in the citadel, he was rescued by Antiochus, who destroyed a part of the city, sold many of his opponents into slavery, and robbed the temple (170). But worse was to follow. During the second expedition of the Syrian king against Egypt, a false report of his death spread in Judea, and Jerusalem immediately rose against his officers. But the Hellenizing Jews opened its gates to the returning king, and an unparalleled slaughter of the religious inhabitants

ensued (169). Not satisfied with this, Antiochus destroyed the walls of the city, garrisoned a new citadel with his soldiers, and decreed the general and exclusive introduction of Greek idolatry. The image of the king was placed in the temple, swine were sacrificed on the altar, new altars were everywhere erected for the obligatory worship of the Olympian Jupiter, the Hebrew Scriptures were burned, circumcision was prohibited, and every act of opposition made a capital crime and punished with extreme cruelty. Thousands after thousands were dragged into captivity, sold as slaves, or butchered. Finally the king departed on an expedition against the Parthians, leaving the completion of his work to his general Apollonius (167). The latter continued it in the spirit of his master, but soon met with a sudden check. Mattathias, an old priest of the village of Modin, and of the distinguished house of the Asmoneans, and his five sons John (Johanan), Simon, Judas, Eleazar, and Jonathan, commanded to sacrifice to Jupiter, drew their swords in defence of their religious liberty, and soon after were able to defend that of others. The people flocked after them into the wilderness, whence they sallied forth to destroy the altars of their oppressors. Contempt of death gave victory, and victory created new warriors. The work of liberation was successfully commenced when the old patriot died (166), leaving the command in the hands of Judas, who well deserved by his overwhelming victories the surname of the Hammer (*Makkab*), though the name of Maccabees, which is applied to the whole house, and the title of the apocryphal books of their history, may have been derived from the initials of a supposed Scriptural sign, M(i), K(amokha) B(aelim) Y(ehovah) ("Who is like thee among the gods, O Everlasting?"), or from those of the name of the father, Mattathias Kohen (the priest) ben (son of) Johanan. Terror reigned among the Syrians in Judea. Their greatly superior forces suffered defeat after defeat under Apollonius, Seron, Lysias, Timotheus, Nicanor, and other generals. Jerusalem was reconquered, the temple purified, a treaty of alliance concluded with the Romans, the traitor Menelaus was executed by order of Antiochus, and the latter soon after died (164). But the bold struggle of the heroic brothers again became desperate. Eleazar (or perhaps another warrior of the same name), rushing through the thickest of the enemy to transpire an elephant, on which he supposed the young king Eupator himself to be seated, was crushed to death under the falling animal. Judas, seeing himself deserted by most of his followers at the approach of an immense host under Bacchides, and having no alternative but flight or death, chose the latter, attacked the Syrians with 800 men, broke through one of their wings, but was surrounded by the other, and perished with all his companions (160). The surviving brothers again fled to the wilderness of the south, carrying on a desultory warfare, in which

John soon after fell. But the protracted struggles for succession to the throne of Syria, between the various kings and usurpers who followed Eupator, Demetrius Soter the son of Epiphanes, his pretended brother, Alexander Balas, Demetrius Nicator the son of Soter, Antiochus the son of Balas, Antiochus Sidetes the son of Nicator, and Tryphon, gave Jonathan, who now commanded, and after him Simon, ample opportunity to restore the fortune of the war. Jonathan's friendship was soon sought by the rival pretenders; he made peace with the one or the other, was acknowledged as high priest, *strategus*, and ethnarch of Judea, and was successful in his long wars, but was finally enticed to an interview with Tryphon, and assassinated with his sons. Simon conquered the citadel of Jerusalem, renewed the alliance with Rome, and was proclaimed an independent prince. The independence of Judea was successfully defended against Antiochus Sidetes under the command of John and Judas his sons, but the old man was soon after assassinated with his sons Judas and Mattathias by his own son-in-law Ptolemy (185). His surviving son, John Hyrcanus, who succeeded him, resisted the invasion of Antiochus Sidetes, concluded a peace, and further developed the independence of the country, extending its limits by the conquest of Idumæa, and of the city of Samaria, which he destroyed, as well as the temple on Mount Gerizim. The Samaritans were thus crushed, but the Sadducees attained great influence under his reign, and the religious dissensions, assuming also a civil aspect, gradually undermined the foundations of the newly restored state. John Hyrcanus and his sons Aristobulus (106-5) and Alexander Jannæus (105-78), belong to the small number of Maccabees who died a natural death; for the race of priestly warriors, who conquered their dignity by the sword, were doomed to perish by the sword, and only the earlier members of the house who fought for the liberty of their people fell in glorious battles. Aristobulus, who assumed the royal title, ordered the murder of his brother Antigonus, while their mother was starved in a dungeon. Alexander Jannæus proved equally barbarous in a war of six years against the majority of his people, who abhorred him as a debauched tyrant and Sadducee, and stained his victory by the execution of 800 of the most important rebels before the eyes of his revelling court. Thousands sought refuge in flight, and he was allowed to continue his reign till his death, when he advised his wife Alexandra (or Salome) to follow an opposite line of policy. She accordingly chose her councillors from among the distinguished men of the national party, and recalled the exiles. Of her two sons, she appointed Hyrcanus high priest, keeping the political rule herself. Dissatisfied with this arrangement, the younger, Aristobulus, sought for support among the Sadducees, and after the death of their mother (71) a long civil war was waged by the

two brothers, which was terminated only by the interference of the Romans, to whom both applied. Scaurus, the lieutenant of Pompey the Great in Syria, decided for the younger of the brothers (63). But Pompey soon after reversed the sentence, besieged Aristobulus in Jerusalem, took the city and the temple, entering both amid streams of blood, and confirmed Hyrcanus as high priest, in which capacity he became tributary ethnarch of the Romans. Aristobulus and his sons, Alexander and Antigonus, were carried as captives to Rome. Judea, with narrowed limits, was now a province of the Roman republic, which was just advancing to its furthest boundary in the East. In the name of Hyrcanus it was governed by Antipater, his crafty Idumæan minister, who ruled his feeble master, and was finally himself established by Cæsar, after the fall of Pompey (48), as Roman procurator of Judea. Aristobulus and his two sons escaped from Rome, and made desperate efforts to recover their dignity, but all of them perished in the successive attempts. Antigonus procured aid from the Parthians, who, having vanquished Crassus (53) and other Roman generals, invaded Judea and carried Hyrcanus into captivity. But he finally succumbed to the son of Antipater, Herod, who on his flight to Rome had gained the favor of the new triumvirs, and who now inaugurated under their auspices, as a powerful independent king, the last dynasty in Judea, the Idumæan (39). This prince, who as if in irony has been called the Great, was the slave of his passions, as well as of the Romans, and the bloody master of his subjects. His ambition made him rival in splendid structures, among which was the rebuilt temple, in the erection of new fortresses, citadels, and cities, and in unlimited sway, the glory of King Solomon, but did not prevent him from basely cringing before Mark Antony, his mistress Cleopatra of Egypt, and his rival Octavius, and from sacrificing the most sacred customs and usages of the people in order to flatter the vanity of his foreign supporters. Gladiatorial games, statues, and other things abhorred by the Jews, were introduced in their cities, and the Roman eagle was placed on the top of the new temple. The desire of the people for the national house of the Maccabees was to be stifled in the blood of its last descendants, though Herod was himself the husband of Mariamne, the granddaughter of Hyrcanus by her mother Alexandra, and of Aristobulus by her father Alexander. Antigonus was executed by the Romans at Damascus; the old Hyrcanus was enticed from Babylon to share the same fate in Jerusalem; the young and beautiful brother of the queen, the high priest Aristobulus, was treacherously drowned while bathing with the king. Herod's own house followed, treacherous intrigues and the dread of conspiracies demanding new victims. His uncle Joseph, his frantically beloved, beautiful, and noble Mariamne, her mother Alexandra, his two sons by

Mariamne, the favorites of the people, perished successively at his order; and finally, five days before his own death, his son by another wife, Antipas or Antipater, next to Herod's sister Salome the chief cause of the last murders and of the king's dreadful agonies. The blood of many other innocent persons was shed, attempts at insurrection or regicide being quelled or punished with remorseless rigor. In extent of possessions, however, Herod's reign by far surpassed the power of his predecessors. Augustus divided his territory among his three surviving sons. Archelaus, as ethnarch, received half of them, viz.: Judea (proper), Samaria to the north, and Idumæa to the south; Philip and Herod Antipas, as tetrarchs, the other half—the former, Batanæa, Trachonitis, and Auranitis, E. of the Jordan (Peraea), and the latter, Galilee W. of the Jordan and N. of Samaria, with some slight additions. Anarchy was a natural consequence of this arbitrary arrangement, and it came with all its horrors.—Such was the political condition of the Jewish state in the first year of the Christian era, about three years after the birth of the founder of the Christian religion, for an account of whose life, doctrine, and death (in the year 33, under the sway of the Roman procurator Pontius Pilate, the possessions of Archelaus having been annexed to the Roman province of Syria) we refer the reader to special articles under the appropriate heads. The religious and literary institutions of the people had in the mean while received a remarkable development during the Asmonean period, on the basis of the *sopherim*, and principally under the lead of the successive schools of the *'hakhamim* (scholars) Jose of Zeredah and Jose of Jerusalem, Joshua ben Perachiah and Nittai of Arbel, Judah ben Tabbai and Simeon ben Shetah, and Shemaiah and Abtalion; and it reached a most flourishing condition under the school of the great Hillel the Babylonian, president of the sanhedrim like all the first of the above named pairs, and the rival school of the austere Shammai, in the reign of Herod. The eminent philosophical book of Ben Sirach and the first book of the Maccabees are the products of the earlier part of that period, while the age of the books of Tobit, Judith, Baruch, and other apocryphal writings, is unknown. The simultaneous literary activity of the Jews in Africa is evinced in the book of Wisdom, by their numerous contributions to Hellenistic poetry and history (Jason, Alexander Polyhistor, Ezekiel, &c.), and especially to Platonic philosophy, from Aristobulus, the Jewish teacher of Ptolemy Euergetes, to Philo, the distinguished deputy of the Alexandrian Jews to the Roman emperor Caligula. The emperors were already becoming the exclusive masters of Palestine. Archelaus was carried captive to Gaul under Augustus (8), and separate procurators ruled Judea, Samaria, and Idumæa. Philip's possessions were attached to Syria after his death (35) by Tiberius, but afterward given by Caligula to Herod Agrippa,

a grandson of Herod, and brother of Herodias, who, being unlawfully married by Herod Antipas, caused the deposition of the latter, and the annexation of his tetrachy to the dominion of Agrippa, who even succeeded in reuniting for a short time, in the reign of Claudius, the whole of Palestine. After his death (44) his territory was again ruled by procurators, and only a small portion was afterward given to his son Agrippa II. (53). The condition of the country was dreadful. The emperors, at that time the vilest of men, demanded divine honors, their statues were erected in the temple, the procurators grew rich by extortions, and the petty Herodian courts shamelessly imitated the licentiousness of the imperial, robbers infested the mountainous regions, impostors and fanatics raised the standard of rebellion, and insurrections led to new oppression, both religious and civil. Nero's rule, and the extortions of his procurator Gessius Florus, finally drove the people to despair. Death to the Romans or to themselves became the cry of the fanatics and the poor. The Sadducees and the rich opposed it in vain, though aided by the troops of Agrippa. The temple of Jerusalem, the ancient capital itself, and numerous strongholds in the country were taken by the insurgents (66). The Roman governor of Syria, Cestius Gallus, who hastened to Jerusalem, was routed near that city. The zealots now organized a general rising. The priest Josephus, the historian, was sent to arm and defend Galilee. But one of Nero's best generals, Vespasian, was already approaching from the north (67); and Titus, his son, brought new legions from Egypt. The Jews fought with Maccabean valor near Joppa, at Mount Gerizim, in the streets of Gamala, at Jotapata, and other places. But Josephus's army perished in the struggle about Jotapata, and he was made prisoner; Galilee was lost, and civil carnage raged within the walls of Jerusalem between the moderates under the priest Eleazar, the terrorists under John of Giscala, and the volunteers commanded by Simon the Idumean. Vespasian now advanced and took most of the strongholds (68). The events which followed the death of Nero, however, checked his progress. Vespasian himself being proclaimed emperor by his legions (69), Titus took the command. Jerusalem, Masada, Machærus, and Herodium were still to be besieged. The northern part of Jerusalem, Bezetha, was first taken by the Romans with the external wall. The middle wall, too, fell into their hands, but the defenders, now united and heroically fighting, drove them out. The Roman resolved upon conquering by hunger, and this brought pestilence to his assistance. Hay, leather, and insects were finally consumed; the victims could no longer be buried, but were thrown over the wall. Deserters and fugitives were mutilated by the besiegers or driven back. The castle Antonia, and with it the second wall, were finally taken (June, 70). John and Simon

still refused to hear of surrender. In August the temple was stormed, and Titus was unable to prevent its becoming a prey to the flames. The last defenders retired to the fortified upper city, which fell in September. Jerusalem was razed to the ground, its surviving inhabitants were slaughtered by thousands, sold into slavery, or doomed to perish in public fights with wild beasts before Romans and Greeks, at the command of the future *amor et delicia generis humani*. Herodium, Machærus, and Masada still defended themselves for a time. In the latter the conquerors found only a few children, the last men having died by their own hands. A million of Jews perished in this war, which found an eloquent but partial historian in the learned captive Josephus. The later and still more furious risings of the scattered people in the reigns of Trajan and Hadrian in Cyrene, Egypt, Cyprus, and Palestine, where Bar-Cokheba for years victoriously maintained himself against the Roman generals until he fell with his last stronghold Bethar, are known only from scattered passages full of exaggerations, dictated by hatred on one side and patriotic admiration on the other.—The last insurrection, and the bloody persecutions which followed it, finally broke the strength and spirit of the people. Their leaders prohibited every attempt at insurrection in the name of religion, and were obeyed. Hadrian's *Ælia Capitolina* rose on the sacred ground of Jerusalem, and his decrees forbade the Jews to enter its precincts. Its environs were desolate. The land of Israel was no more; the people scattered all over the world. The previous invasions and conquests, civil strifes and oppression, persecution and famine, had carried hosts of Jewish captives, slaves, fugitives, exiles, and emigrants, into the remotest provinces of the Medo-Persian empire, all over Asia Minor, into Armenia, Arabia, Egypt, Cyrene, Cyprus, Greece, and Italy. The Roman conquest and persecutions completed the work of dispersion, and we soon find Jews in every part of the empire, in the regions of Mt. Atlas, on both sides of the Pyrenees, on the Rhine and Danube. Palestine, however, for some time continued to be a national centre through its schools of religious science, which after the desolation of Jerusalem flourished at Jamnia, Lydda, Usha, Sepphoris, Tiberias, and other places, principally under the lead of the presidents of the sanhedrim (patriarchs, *nesiim*) of the house of Hillel, of whom Gamaliel Hazzaken (the Elder), his son Simeon, his grandson Gamaliel, and great-grandson Simeon, with their celebrated fellow *tana'im* (teachers or scholars) Johanan ben Zakkai, Eliezer, Joshua, Eleazar, Ishmael, Tarphon, the great Akiba, and others had been successfully active during the previous disastrous period. The succeeding rabbis (*rabbim*, my master), Ben Azai, Ben Zoma, the five pupils of Akiba, Eliezer, Meir, Jose, Jehudah, Simeon, Nathan, and others, continued their work by public teaching, as well as by collect-

ing, elucidating, systematizing, and further developing the decisions (*halakhoth*, collectively termed *Halakhah*) of the oral law, which was finally converted into a written code or compendium of teachings (*Mishnah*) by the patriarch Judah the Holy and his school, during the mild reigns of the Antonines. To this were added the partly supplementary, partly explanatory works, *Tosephta*, *Mekhilta*, *Saphra*, and *Siphri*. These works became the basis of religious study in the subsequent three centuries, in Palestine, as well as in Babylonia, where the schools of Sura, Pumbeditha, Nehardea, and others, flourished under more favorable circumstances, the most renowned teachers (in this period *amoraim*) of both countries being Rab, Samuel, Joshua ben Levi, Johanan, Simeon ben Lakish, the patriarch Jehudah II., Ame, Ase, Abahu, Eleazar, Jehudah, Hunna, Hisha, Nahman, Rabbah, Joseph, Zera, Jeremiah, Abbaye, Raba, Pappa, Ashe, Abina, and Mar bar (ben) Ashe (died 467). After new persecutions by the Christian emperors, which destroyed the schools (353) and the patriarchate (429) of Palestine, and by the Persian kings Yezdegerd II., Hormuz, Firuz, and Kobad in the latter part of the 6th century, which destroyed the schools of Babylonia, the results of those studies were also collected, though in chaotic disorder, in the two Gemaras or Talmuds (literally, studies), the Palestinian and Babylonian. Other extant products of the time of the *tana'im* and *amoraim* were various ethical treatises (*Derekh erez*, *Aboth*, &c.), historical, legendary, and cosmogonical writings (*haggadoth*, stories, collectively *Haggadah*, a vast branch), prayers (*tephilloth*), additions to the Chaldee paraphrase (*Targum*) of Scriptural books, a new calendar, admirably adapted to the religious duties of the people, by Hillel (840), and some Greek fragments by Aquila and Symmachus. The Chaldee, often with an admixture of Hebrew, was now generally used in literary works, while the people used the various languages of the countries in which they lived. More and more oppressed and degraded by the emperors, of whom only Julian was favorable to his Jewish subjects, and even attempted to rebuild the temple of Zion, and by the decrees of the councils, the Jews of Palestine once more hoped to recover their independence when they assisted the Persians in conquering Jerusalem (616), but were soon severely chastised for their rash attempt by the victorious emperor Heraclius. But a new power springing from the Arabian desert was destined to humiliate all the contending parties and sects between the Tigris and the Nile, the Byzantine emperors and the Sassanide shahs, Christians, fire worshippers, and Jews. A new Semitic prophet arose in the vicinity of the Red sea, teaching his disciples and people a monotheism which was to be carried triumphantly over a great part of Asia, Africa, and Europe (622). Mohammed himself after a long struggle conquered the castles of the independent Jews in Arabia, who, liv-

ing from a very remote period in that country, were masters both of the poetical tongue and the sword of the desert, their warlike Samuel ben Abdiah, among others, being one of the most distinguished early poets of the peninsula. Omar and his generals conquered Jerusalem, Tiberias, Damascus, Antioch, and Alexandria from the Byzantines, and subdued Persia, thus bringing most of the eastern Jews under the rule of Islam. This proving comparatively mild, and the later caliphs favoring every science, Jewish studies revived, especially in Babylonia, where the Jews lived under the immediate rule of a prince of the captivity (*resh gelutha*), and where their great schools, having been reorganized under the *seboraim* (thinkers), were made flourishing under the *geonim* (the eminent). Of these Saadia, the translator of the Pentateuch into Arabic (died 941), and Hai (died 1037), the son of Sherira, and son-in-law of Samuel ben Hofni, are eminent as theological writers, poets, and linguists. Numerous works of *Haggadah*, now mostly known as *midrashim*, and ethical writings, were composed; the critical notes of the Masora and the "Targum of Jerusalem" elaborated; the admirable system of Scriptural vocalization introduced; talmudical compendiums written; medical, astronomical, and linguistic studies, and also cosmogonical speculations (*Kabbalah*), pursued. An anti-rabbinical sect, besides the extinct Sadducees the only one which deserves that appellation, was founded about the middle of the 8th century by Anan in Babylonia, receiving from their strict adherence to the letter of the Bible the name of Karaites (Scripturists). Their scholars, Salmon, Jeshua, and Japheth, flourished in the 10th century. Scientific pursuits also spread among the Jews in Africa, who with slight interruptions enjoyed peace under the Saracenic princes; and among the theological writers of Fez and Kairowan in that period, of whom Nissim and Hananel (both in the first half of the 11th century) are the most celebrated, we find the physician and critic Isaac ben Soleyman, the lexicographer Hefetz, and the grammarians Ben Koraish, Dunash, and Hayug. The Arabic was generally used by the scholars.—The political and intellectual condition of the Jews was worse in the Byzantine empire and in the feudal states which arose on the ruins of the West Roman. Deprived of most civil rights, they were now and then bloodily persecuted, as by the Franks and Visigoths in the 6th and 7th centuries, by the Byzantines in the 8th, when many of them fled and even spread their religion among the Khazars about the Caspian sea, and again in the 11th, about which time they appear in Russia, though only for a short time, and in Hungary. More tolerable, however, was their situation in Italy, Sicily, and Sardinia, where they often found protection through the influence of the popes. Bari and Otranto became the principal seats of Jewish learning. The renowned Eleazer ben Kalir

and other writers of *piyutim* (liturgical songs in Hebrew rhymed verse), the historian Josipon, and the astronomer Shabthai Donolo, flourished in Italy in the 9th and 10th centuries, and the lexicographer Nathan in the 11th. From Italy science spread to the cities on the Rhine, to Lorraine and France. In the 11th and 12th centuries we find in Germany Simeon, the author of the talmudical *Yalkut* ("Gleaning Bag"), the poet Samuel the Pious, and the writer of travels Petahiah; in northern France, Gerson, surnamed the "light of the exiled," the liturgical poet Joseph Tob Elem, the renowned commentators Solomon Isaaki and his grandson Solomon ben Meir, and the authors of the talmudical *Tosafoth* ("Additions"), Isaac ben Asher, Jacob ben Meir, &c. Spain, after the conquest by the Saracens, who carried thither culture, science, and poetry, was destined to develop the most prosperous and flourishing condition which the Jews enjoyed in the middle ages. Persecutions became rare and exceptional. The Jews enjoyed civil rights and rose to high dignities in the state under the Moorish princes, and were almost as well treated by the Christian monarchs; and their culture and progress in science not only kept pace with their prosperity, but also outlived occasional adversity. In the 10th century we see there the lexicographer Menahem, the astronomer Hassan, and the rich, liberal, and scientific Hasdai, the friend and physician of the caliph Abderrahman III., at Cordova; in the 11th the talmudical scholars Samuel Hallevi and Isaac Alfasi (of Fez), the grammarian Abulwalid, the philosopher David Mokamez, the ethical writer Behai, and Solomon Gabirol, equally celebrated as Hebrew poet and Arabic philosopher; in the 12th the theologian Abraham ben David, the astronomer and geographer Abraham ben Hiya, the poet Moses ben Ezra, the traveller Benjamin of Tudela, the philosophical poet Jehudah Hallevi, whose glowing songs rival the beauties and purity of the Psalms, the great critic, philosopher, and poet Aben Ezra, and finally Moses Maimonides, who as a philosopher and writer on the law by far surpassed all his contemporaries. The diffusion of science among the Jews now attained its height in Europe, as well as in Egypt, whither Maimonides fled after a persecution at Cordova (1157), and where he and his son Abraham officiated as physicians to the court of the sultan. Spain numbered among its vast number of scholars in the 13th, 14th, and 15th centuries, the poets Harizi, the Hebrew imitator of the Arabian Hariri, and Sahlai; the astronomers Aben Sid, one of the authors of the Alfonsine tables, Israeli, and Alhadev; the philosophical theologians Palquera, Lattef, Caspi, Hasdai, Albo, and Shemtob; the celebrated commentators Nahmanides, Adde-reth, Gerundi, Behai, Yomtob, and Nissim; the cabalists Todros, Gecatilia, Abelafia, and De Leon. In Provence and Languedoc, where high schools flourished in Lunel, Nîmes, Nar-

bonne, Montpellier, and Marseilles, from the 12th to the 15th century, we find the three grammarians Kimhi and their follower Ephodi; the poets Ezobi, Jedaiah, and Calonymus; the commentators Zerahiah Hallevi, Abraham ben David, and Menahem ben Solomon; the philosophers Levi ben Abraham, Levi ben Gerson, and Vidal; the four Tibbons, all translators from Arabic into Hebrew, and the lexicographer Isaac Nathan. Italy had in the 13th, 14th, and 15th centuries the poets Immanuel, an imitator of Dante, Moses di Rieti, and Messir Leon; the talmudists Trani and Colon; the cabalist Recanate; the astronomer Immanuel; various grammarians and translators from Arabic and Latin; and finally the philosopher Elias del Medigo. Germany had in the same period the talmudists Meir, Mordecai, Asher and his son Jacob, and Isserlin, the cabalist Eleazar, and others. The Karaites, too, had a number of scholars, as Hadassi, the two Aarons, and others. During the earlier part of this long period of literary activity in the West the Jews enjoyed peace and prosperity, with various interruptions, in Spain, Portugal, Italy, Greece, the islands of the Mediterranean, in Hungary, especially under the national kings, and in Poland, which hospitably received the numerous exiles from all neighboring countries, under the Piasts, particularly the last of them, Casimir the Great; but there were none in Muscovy and in the Scandinavian states; and in England, where they appear before the time of Alfred, in France, where only the early Carolingians, and especially Charlemagne, favored them, and throughout Germany, their condition was in the last degree deplorable. Circumscribed in their rights by decrees and laws of the ecclesiastical as well as civil power, excluded from all honorable occupations, driven from place to place, from province to province, compelled to subsist almost exclusively by mercantile occupations and usury, overtaxed and degraded in the cities, kept in narrow quarters and marked in their dress with signs of contempt, plundered by lawless barons and penniless princes, an easy prey to all parties during the civil feuds, again and again robbed of their pecuniary claims, owned and sold as serfs (*Kammerknechte*) by the emperors, butchered by mobs and revolted peasants, chased by the monks, burned in thousands by the crusaders (who also burned their brethren of Jerusalem in their synagogue), tormented by ridicule, abusive sermons, monstrous accusations and trials, threats and experiments of conversion, the Jews of those countries offer in their mediæval history a frightful picture of horrors and gloom. In England they had their worst days in the reign of Richard I., at whose coronation they were massacred at York (1189), John, Henry III., and Edward I., who expelled them altogether from the realm (1290). From France they were for the last time banished under Charles VI. (1395). Germany, where the greatest anarchy prevailed, was the scene

of their bloodiest persecutions, the most frightful of which took place in the cities on the Rhine during the great desolation by the black plague which depopulated Europe from the Volga to the Atlantic (1348-50). Pointed out to the ignorant people as having caused the pestilence by poisoning the wells, the Jews were burned by thousands on the public squares, or burned themselves with their families in the synagogues. Almost every imperial city had a general persecution of the Jews. The Swiss towns imitated their neighbors, almost all banishing their Jews. With the growing influence of the inquisition, the Jews of southern Europe, too, suffered the same fate. The protection of the popes being gradually withdrawn, they were banished from the cities of Italy into separate quarters (*ghetti*), and obliged to wear distinctive badges; persecutions became more frequent; in 1493 all the Jews of Sicily, about 20,000 families, were banished. In Spain, during a long drought in 1391-'2, the Jewish inhabitants were massacred in many cities. The condition of the Jews grew worse in the following century, until their extirpation from the whole country was determined upon, and, after repeated but fruitless attempts at conversion by the stake, finally carried into effect by Ferdinand and Isabella (1492). More than 70,000 families sought refuge in Portugal, where for a large sum of money the fugitives were allowed to remain for a few months, in Africa, Italy, Turkey, and other countries. Not the fifth part of them survived the horrors of compulsory expatriation, shipwreck, and subsequent famine. The feeling observer may find a compensation in the fact that while these events happened, propitious winds carried three small caravels across the Atlantic to a new world, whose enervating treasures were destined to assist the inquisition in undermining the power of the oppressors, and whose future institutions were to inaugurate an era of freedom to the descendants of the oppressed. The Jews of Portugal were banished soon after (1495) by King Emanuel, being robbed of their children under 14 years of age, who were sent to distant islands to be brought up as Christians. The numerous converted Jews of the peninsula and their descendants were still persecuted for more than two centuries by governments, inquisitors, and mobs. These persecutions, which eventually carried the bulk of the European Jewish population into the provinces of Poland and Turkey, similar events in the East during the crusades, a long series of persecutions in Germany, and in central and southern Italy in the 16th century, and bloody massacres by the revolted Cossacks under Chmielnicki in the S. E. regions of Poland, together with a general and minutely developed system of petty oppression, extortion, and degradation, to which the Jews were subjected in most parts of Europe during the 250 years following their expulsion from the Iberian peninsula, could not but exercise a disastrous influence upon the cul-

ture and literature of the people. The spirit of cheerful inquiry, study, and poetry which distinguished the Spanish-Provençal period, was gone. The critical knowledge and use of the Hebrew was neglected, the study of the Talmud and its commentaries became the almost exclusive occupation of the literary youth, and cabalistic speculations replaced philosophy, producing in Poland various schools of religious enthusiasts called '*Hasidim* (pietists). A bold Turkish Jew, Shabthai Tzebi, who, like the Persian Aldand or Alroy in the 12th century, was proclaimed by his cabalistic followers the expected Messiah of Israel, found numerous adherents even in various parts of Europe (1666), whose delusion was destroyed only by his compulsory conversion to Mohammedanism. Literature and science, however, still found scattered votaries, especially in northern Italy, Turkey, and Holland; and besides the great talmudists, theologians, or commentators of this period, Don I. Abarbanel, I. Arama, J. and L. Habib, Mizrahi, O. Bartenura, O. Sforzo, I. Luria, J. Karo, the author of the talmudical abridgment or code *Shulchan arukh*, E. Ashkenazi, Alsheikh, S. Luria, M. Isserels, M. Jaffe, Sirks, S. Cohen, Lion of Prague, E. Lentschütz, J. Trani, J. Hurwitz, H. Vital, S. Edels, Y. Heller, Shabthai Cohen, A. Able, D. Oppenheimer, the collector of the best Hebrew library (now in Oxford), Tzebi Ashkenazi, H. Silva, J. Rosanis, D. Fränkel, J. Eybeschütz, J. Emden, H. Landau, Elias of Wilna, &c., we find the philosophers and men of science Bibago, S. Cohen, Amatus, Almosnino, De Castro, A. Zaccuto, J. del Medigo, M. Hefetz, and Nieto; and among the poets, grammarians, critics, lexicographers, and historical writers, De Balmes, Elias Levita, A. Farissol, Solomon ben Melekh, Jacob ben Hayim, Gedaliah, Yahiah, A. de Rossi, De' Pomi, D. Gans, S. Árkevolte, Lonsano, Manasseh ben Israel, the defender of the Jews before Cromwell, S. Norzi, S. Luzzato, Leo de Modena, S. Mortera, J. Orobio, Shabthai ben Joseph, B. Mussaphia, De Lara, J. Cardoso, J. Abendana, S. Hanau, M. H. Luzzato, J. Heilprin, Azulai, and others. Beyond the limits of the Turkish empire there was scarcely any trace of Jewish literature in the East, though there were and are still numerous Jewish communities in Persia, northern Arabia, Independent Tartary, and Afghanistan, as well as scattered colonies, mostly of more or less mixed race and religion, in India, China, Cochin China, Yemen, Abyssinia, and other parts of Africa, partly of very ancient date, partly founded by escaped Portuguese and Spanish New Christians, some of whom also settled in parts of Brazil and Guiana during the occupation by the Dutch. In Europe the last of the three great religious struggles, against paganism, against Mohammedanism, and between the contending Christian sects, all of which were destructive to the Jews, was terminated by the peace of Westphalia (1648). Catholicism was triumphant in the south and

in France, Protestantism in the north and northwest. The greater persecutions of the Jews now ceased. They became flourishing in the republics of Holland and Venice and their dependencies, were readmitted into England by Cromwell (having also entered Denmark and returned into France), spread with the Dutch and English to various parts of America, reentered Russia under Peter the Great (to be expelled afterward), were admitted in Sweden, and were protected and often employed in high stations by the sultans of Turkey and Morocco. In Germany and Switzerland, where the struggle was not terminated by any decisive triumphs, the mediæval treatment of the Jews was continued longest, its worst features being maintained and developed in Austria (excepting in the reign of Joseph II.). In this empire, down to the revolution of 1848, the Jews were excluded from all civil rights, numerous professions, and various provinces, districts, towns, villages, and streets, paying besides a tax for toleration in Hungary (in spite of the remonstrances of the legislatures), a tax upon their sabbath lights in Galicia, and a residence tax when visiting Vienna, and being subject to Pharaonic marriage restrictions in Bohemia and Moravia. The general progress of freedom was promoted in the age of philosophy by the appearance of Spinoza and of Mendelssohn (1729-'86) among this long despised people. The influence of the latter upon Jews and Christians through his works, example, fame, and friends (the great Hebrew poet Wessely, Euchel, Löwe, Friedländer, &c., among Jews, and Lessing, Dohm, Abt, Nicolai, Engel, Ramler, &c., among Christians), was immense; and his admirers could say, "Between Moses (the lawgiver) and Moses (Mendelssohn) there was only one Moses (Maimonides)." Progress now became general among the Jews, and the noble philosopher lived to see the first dawn of freedom in the land of Franklin and Jefferson. The great revolution in that of Voltaire and Rousseau came next, and the triumphs of republican and imperial France destroyed the mediæval institutions on the Rhine and Po. Liberty, crushed in Poland by the Russians, when 500 of Kosciuszko's Jewish volunteers fell fighting to the last on the ramparts of Praga (1794), was successively victorious in the West. Proclaimed in the United States and France, the rights of the Jews were recognized in Holland, Belgium, Denmark, parts of Germany, Canada, and Jamaica; in 1848-'9 throughout Germany, Italy, and Hungary; and finally in Norway and England. Among the most zealous defenders of the rights of the Jews we may mention the Frenchman Grégoire, the Pole Czacki, the German Welcker, the Irishman O'Connell, the Englishman Lord John Russell, the Italian D'Azeglio, and the Hungarian Eötvös, all Christians; the Jews by descent Börne and Disraeli, and the professing Jews Jacobsohn, Riesser, Philipsohn, Montefiore, and Crémieux. The revolutionary movement

of 1848-'9 proved the immense progress of the Jews as well as of public opinion since Mendelssohn and Lessing. The Jews Crémieux, Goudchaux, and Fould were among the ministers of the French republic; Pincherle was a member of the provisional government in Venice; Jacoby of Königsberg was the leader of the opposition in the Berlin parliament; Riesser was vice president of that of Frankfurt; Dr. Fischhof stood at the head of affairs in Vienna after the flight of the court; Meisels, the rabbi of Cracow, was elected to the Austrian diet by Polish patriots; and Hungarian barons and counts willingly fought under Jewish officers. The subsequent reaction, as in Austria, where it was checked by the events of 1859, was mostly temporary, and the Mortara case in Italy in 1858 excited a very general expression of opposition to the antique legislation by which it was decided. Of the vast number of Jewish writers after Mendelssohn (excluding all converts to Christianity like Heine, Neander, or Gans) we mention only a few: the talmudists Jacob of Dubno, Jacob of Slonim, Pick, Jacob of Lissa, Bonet, Eger, Sopher, Chajes; the Hebrew poets, philologists, or critics, E. Luzzato, S. Cohen, Satanow, Wolfsohn, Bensev, Pappenheim, Tropowitz, Heidenheim, Löwsohn, S. Bloch, Simha of Hrubieszów, Jetteles, Landau, Reggio, Perl, N. Krochmal, the great rabbinical critic Rapoport, S. D. Luzzato, Letteris, Eichbaum, P. M. Heilprin, S. Sachs, Kirchheim, Schorr, A. Krochmal; the historians, critics, or publicists on Jewish subjects in modern languages, Zunz, Jost, Riesser, Geiger, Fürst, Philippson, Salvador, Munk, Cahen, Dukes, Frankel, M. Sachs, Jellinek, Herzfeld, Saalschütz, Steinschneider, Grätz, Löw, Bernays, Neubauer, Harkawy, Kayserling, Raphall (New York), Leeser (Philadelphia), Wise (Cincinnati); the conservative theologians Plessner, Johlsohn, Steinheim, and Hirsch; the advocates of religious reform (besides Geiger and Herzfeld) Chorin, Creizenach, Stein, Herxheimer, Holdheim, Hess, Stern, Einhorn (New York), Lillenthal (Cincinnati); the pulpit orators Mannheimer, Kley, Salomon, Frankfurter; the philosophers Maimon, Bendavid, Frank; the mathematicians Wizenhausen, Sklow, A. Stern, Cassel, Hirsch; the astronomers W. Beer, Stern, Slonimski; the ichthyologist Bloch; the physiologist Valentin; the anatomist Hirschfeld; the botanist Pringsheim; the poets Kuh, M. Beer, Frankl, Léon Halévy; the miscellaneous writers Auerbach, Bernstein, M. M. Noah, Grace Aguilar, Jules Janin; the orientlists Weil, Dernburg (Derenbourg), Oppert, E. Deutsch, Levy (besides Munk). Politics, law, medicine, and the arts, including the stage (Mlle. Rachel, &c.), have had numerous representatives, and especially music (Moscheles, Meyerbeer, Halévy, &c.).—The number of Jews in all parts of the world is hardly less than 6,000,000, or more than 7,000,000.—THE HEBREW LANGUAGE (Heb. *Ibrith*, or *lashon Ibrith*, Hebrew tongue, also *lashon hakkodesh*, sacred tongue, in

post-Biblical Jewish works; *Yehudith*, Jewish, in the Biblical history of the period following the captivity of the ten tribes; in Isaiah, poetically, also *sefath Kena'an*, language of Canaan), together with scanty remnants of the Phœnician and Punic, belongs to the so-called Canaanitic branch of the Semitic family of languages. (See SEMITIC RACE AND LANGUAGES.) In the antiquity of its extant literary remnants the Hebrew by far surpasses all other Semitic idioms, and in richness and development exceeds all others except the Arabic. The Hebrew is deficient in grammatical technicalities, especially in moods and tenses of the verb, and consequently also somewhat in precision; but in euphony, simplicity, brevity, variety of signification, and power of poetical expression, it is hardly excelled by any tongue. In its full purity the Hebrew appears in the earlier books of the Bible, in the mediæval poetical works of Judah Hallevi, Aben Ezra, &c., and in the modern poems of Wessely, S. Cohen, and others. The prose writings posterior to the Babylonish captivity are generally tinged with Aramaisms, especially the Mishnah, which also contains numerous Greek words, while the mixed idiom of the Gemara and its commentaries may be termed Chaldaic rather than Hebrew. (See TALMUD.) In the middle ages pure Hebrew was used only in poetry and poetical prose; in modern times it is used also in simple prose. In the East and in Poland the Hebrew is often used in correspondence, in the East occasionally also as a medium of conversation with occidental Jews. Of the various modes of Hebrew pronunciation, the Sefaradic (improperly Portuguese), or that of the descendants of the exiles from Spain and Portugal, is regarded by scholars as the most genuine. There are three kinds of Hebrew alphabets now in use: the square, also called the Assyrian (properly Babylonian), which is generally supposed to have been introduced by Ezra, the most common in print; the rabbinical or mediæval, used chiefly in commentaries and notes; and the cursive, in writing. The most ancient Hebrew, however, is believed by many critics more to have resembled the Phœnician (see ALPHABET), and to be best represented by the Maccabean coins and the alphabet of the Samaritan version of the Pentateuch. The writing is from right to left. The alphabet consists of 22 letters or consonants, called *aleph*, *beth*, &c. (see ALPHABET), the vowels being expressed by marks above or below the letters, thus: א, *a*; ב, *be*; ג, *gi*; ד, *do*. Five letters (*kaph*, *mem*, *nun*, *pe*, *tsade*) have a separate final form. There are no capital letters. The accents and marks of punctuation are very numerous. The following examples will exhibit some of the most interesting features of the language: *Kol*, (a) voice, *hakkol*, the voice; *gan*, garden, *haggan*, the garden; *shem*, name, *hashshem*, the name. *Dod*, uncle, *dodah*, aunt; *dod zeken*, an old uncle, *dodah zekenah*,

an old aunt; *dodim zekenim*, old uncles, *dodoth zekenoth*, old aunts; *dod e'had*, one uncle, *dodah a'hath*, one aunt; *shenei dodim*, two uncles, *shetei dodoth*, two aunts. *Ozenayim*, *raglayim*, *alpayim*, two (a couple of) ears, feet, thousands. *Banim*, sons, *banoth*, daughters; *benei david*, *benoth david*, sons, daughters of David. *Ani gadol*, I am great, *hu gadol*, he is great, *hem gedolim*, they are great. *Koli*, my voice, *kolo*, his voice, *kolam*, their voice, *kolan*, their voice, speaking of females. *Lemosheh*, to Moses, *bemosheh*, in Moses, *kemosheh*, like Moses, *middavid*, from David. *Bo*, in him, *lo*, to him; *banu*, in us, *lanu*, to us. *Bein*, between; *bein mosheh vedavid*, between Moses and David; *beini ubeino*, between me and him. *Min*, from; *gadol middavid*, greater than David; *haggadol baaretz*, the greatest in the land. *Golyath raah eth david*, Goliath saw (looked at) David; *golyath hereph eth david*, Goliath insulted (mocked at) David; *david hikkah eth golyath*, David struck (at) Goliath. *Shamor*, to guard; *eshmor*, I shall guard, *tishmor*, thou wilt guard, *nishmor*, we shall guard; *shamarti*, I (have) guarded, *shamarnu*, we guarded, *shemartem*, ye guarded; *ani shomer* (I am guarding), I guard, *hu shomer*, he guards, *hi shomera*, she guards, *hem shomerim*, they guard; *shamar*, (he) guarded, *nishmar*, was guarded, *hishtammer*, guarded himself; *lishmor*, to guard, *bishmor*, in guarding; *mosheh shamar*, Moses guarded; *miryam shamera*, Miriam guarded; *shemaran*, (he) guarded me, *shemaro*, guarded him; *yishmerenu*, will guard us; *shomer* (guarder), guardian, *nishmar*, guard, watch, confinement, *ashmoreth*, night watch, *mishmereth*, thing to be watched, observance, trust. *Akhal*, (he) ate, *ikkal*, consumed, *heekhil*, caused to eat, *neekhal*, was eaten, *ukkal*, was consumed.—Among the eminent modern Christian writers (besides the Jewish previously mentioned) on Hebrew history, literature, or language are Reuchlin, the Buxtorfs, Lowth, Basnage, Michaelis, Eichhorn, Herder, Rosenmüller, Jahn, Gesenius, De Wette, Ewald, Quatremère, Milman, Robinson, Noyes, Stuart, Conant, Bush, and Renan.

HEBREWS, Epistle to the, one of the canonical books of the New Testament, addressed to converted Jews, and designed to dissuade them from relapsing into Judaism and to fortify them in the Christian faith. It aims to demonstrate the preëminence of Christ over Moses and the angels of the Lord, and of the gospel over the law, and to show that the latter was typical of the former, and was abolished by it. The epistle was addressed to a congregation of converted Jews, whether at Jerusalem or at some other place is still a controverted point. It is the opinion of most commentators that it was written between 64 and 66. The Greek fathers unanimously ascribed the epistle to Paul, and its Pauline authorship was generally accepted in the western church from the 5th century, though in the first three centuries no Latin writer attributed it to him. Among modern writers its Pauline origin has

been defended. by Stuart, Forster, Hug, and others. In Germany the tendency of opinion has been to ascribe it to some other author. Luther suggested Apollos, and has been followed by Bertholdt, De Wette, Bleek, and Tholuck. Böhme and Mynster ascribe it to Silas; others to Clement, Luke, or Barnabas. Among the best modern commentaries on this epistle are those by Stuart (1827), Bleek (1828), Tholuck (1836), Delitzsch (1850), Ebrard (included in Olshausen's commentary, 1850), Turner (1852), Moll (included in Lange's commentary, 1861), Reuss (1862), and Ewald (1870).

HEBRIDES, or *Western Islands* (the *Hebude* of Ptolemy and the 30 *Hebudes* of Pliny), the general name of the islands on the W. coast of Scotland, lying between lat. 55° 26' and 58° 32' N., and lon. 5° and 8° W.; pop. about 99,000. They are usually classed as the outer and the inner Hebrides. The outer, which are separated from the mainland and the inner islands by a channel called the Minch, extend from the Butt of Lewis on the north to Barra head on the south, forming a kind of natural break-water 130 m. long. The principal ones of this group, which collectively are called the Long Island, are Lewis, North Uist, Benbecula, South Uist, and Barra. The inner Hebrides are irregularly disposed along the coast and in the firth of Clyde, the principal ones being Skye, Raasay, Canna, Rum, Eigg, Coll, Tiree, Mull, Ulva, Staffa, Iona, Lismore, Kerrera, Scarba, Colonsay, Oronsay, Jura, Islay, Arran, Bute, and the Cumbrays. The total area of all the islands, of which there are several hundred, is upward of 3,000 sq. m. Of this surface about 200,000 acres are arable, 700,000 hill pasture, and 65,000 in fresh-water lakes; the remainder is morass and peat bogs, barren sands, and rocks. Only about 120 of them are inhabited. The most are rugged and mountainous, and the coasts, especially of those fronting the Atlantic, are bold and rocky and indented with numerous bays. Arran, Jura, Mull, and Skye have mountains 2,000 or 3,000 ft. high. The lakes are generally small, and none of them are more than three or four fathoms deep. There are many small streams, which in the larger islands abound in salmon. The outer Hebrides are geologically of gneiss formation and have a poor soil. Of the inner islands the more northerly are trap, the southerly ones on the coast are slate, and those in the firth of Clyde are trap, sandstone, and limestone. Marble, limestone, and slate are quarried, the last in considerable quantity. Iron ore is abundant in many of the islands, some copper is found, and lead is worked in Islay to some extent. Coal also exists, but is not mined, peat being used for fuel. The climate, on account of the proximity of the Gulf stream, is exceptionally mild, pleasant, and healthful. In winter the temperature is rarely lower than 27° F., and snow seldom lies long on the lowlands; but fogs and mists prevail and drizzling rains are frequent. In the uplands from 30 to 36 inches of rain

falls annually; on the coast about 25 inches. Violent storms from the southwest are prevalent from August to March. There is little wood on any of the islands, and on many none, although they were mostly clothed with forests several centuries ago; but large plantations have been successfully made, particularly in Skye, Islay, and Mull. Oats, barley, and potatoes are the staple crops, but agriculture is very backward, and nothing is raised for export. In unproductive seasons the harvest is not sufficient for home consumption, and famine has visited the islands more than once. Extensive improvements, however, have been introduced of late years by wealthy proprietors. The principal industry is the raising of kyles or black cattle. The native sheep are small, not weighing more than 20 lbs., but the Cheviot breed has been introduced with success. The horses are small, hardy, and docile, but not so handsome as the Shetland ponies. Of wild animals, a few red deer, wild cats, and foxes remain, and hares, rabbits, and other small game are plentiful. Many of the islands swarm with wild fowl, and the coasts are rich in fish and mollusks. The tenure of land is unfavorable to enterprise, much of the soil being held by tacksmen, an intermediate class between proprietors and cultivators. Many tenants hold their farms at will or on short leases, and sublet on the same terms to cottiers and crofters, most of whom pay rent in services. Excepting where the population has been thinned to make large estates, the farms are generally small, renting at from £5 to £50 each. This division of the arable land occasions an excess of population in some of the islands, which the proprietors have attempted to remedy by encouraging emigration. The condition of the people generally is much depressed, and their dwellings, which are clustered along the coast, are miserable. In some of the southern islands, such as Islay, Arran, and Bute, a better system prevails, and agriculture is in an advanced state. Lines of steamers have been established between Glasgow and the Hebrides, which convey large numbers of tourists to Fingal's cave in Staffa, the ruins in Iona, &c. Gaelic is generally spoken, but English is gradually superseding it. Both languages are taught in the schools. Politically the Hebrides are distributed among the counties of Ross and Cromarty, Inverness, Argyle, and Bute. The principal towns are Stornoway in Lewis, Portree in Skye, Tobermory in Mull, and Rothesay in Bute.—The name Hebrides is a corruption of Pliny's *Hebudes*. The islands were colonized originally by emigrants from Norway about the beginning of the 9th century. They remained subject to the crown of Norway till 1266, when they were attached to Scotland. They were then held by various native chieftains in vassalage to the Scottish crown, but in 1346 the chief of the Macdonalds reduced them to subjection and assumed the title of lord of the isles. They were finally annexed to Scotland by James V.

in 1540; and the abolition of hereditary jurisdictions by act of parliament in 1748 gave a final blow to the nominal independence of the lords of the isles.

HEBRON (originally *Kirjath Arba*; Arab. *El-Khulid*), a city of Palestine, 18 m. S. of Jerusalem; pop. about 5,000. Most of the inhabitants are Moslems; about 50 families are Jews; there are no resident Christians. The city stands partly on the declivities of two hills and partly in the deep and narrow valley of Mamre. At the S. extremity of the town is a mosque, which, according to the Arabs, covers the cave of Machpelah, with the tombs of Abraham, Isaac, and Jacob, and their wives. The architecture of this mosque plainly indicates its original use as a Christian church. Hebron figures in the history of Abraham, who

he succeeded. He was the author of a geographical work entitled *Περίοδος Ἰνδῶν*, or *Περίηγησις*, and of a historical one entitled *Γεωγραφία*, or *Ἰστορίαι*. The former contained a description of various countries in Europe, Asia, and Africa; the latter was a prose account of the mythical history of the Greeks. Some fragments of these works are extant, published in various collections of Greek fragments.

HECATE, a divinity of ancient Greece, who was commonly called a daughter of Perses or Perseus and Asteria. She had dominion in heaven, on earth, and in the sea, and could bestow on mortals wealth, victory, and wisdom. This caused her to be confounded with Ceres, Rhea, Diana, and Proserpine. She was worshipped in Samothrace and Ægina, and at Athens, where small statues of Hecate were

placed in front of houses and at cross roads. Her favorite sacrifices were dogs, honey, and black ewe lambs. In works of art she is sometimes represented as a single being, sometimes as a three-headed monster.

HECKER, Friedrich Karl Franz, a German politician, born in Eichersheim, Baden, Sept. 28, 1811. He early acquired distinction as a lawyer and politician, and was elected to the second chamber of Baden in 1842. In 1845 he travelled with Itzstein for the



Hebron.

bought Machpelah. It was taken by Caleb at the conquest of Palestine by the Hebrews, and became the residence of David in 1055 B. C. It was recovered from the Edomites by Judas Maccabæus, and burned by the Romans under Vespasian. In A. D. 1167 it became the seat of a Latin bishopric. It was taken by Saladin in 1187, and after an insurrection stormed by Ibrahim Pasha in 1834.

HEBRUS, in ancient geography, a river of Thrace. See *MARITZA*.

HECATEUS, a Greek historian and geographer, born in Miletus about 550 B. C., died about 476. He visited Egypt and other provinces of the Persian empire, Libya, Greece, Italy, and other countries. On his return he found the Ionians generally meditating a revolt against Persia, which in spite of his remonstrances was carried out, and ultimately led to the Persian invasion of Greece. After the suppression of the revolt, Hecateus, still high in the esteem of his countrymen, was sent as ambassador to the satrap of the great king to solicit mercy for the vanquished, in which

purpose of disseminating radical views. At Berlin they received an order to leave Prussia in 24 hours. In the diet of 1846-'7 Hecker even opposed the liberal ministry of Bekk, and voted against taxation; but not being sustained by his party, he resigned his seat in March, 1847. He shortly afterward availed himself of a fusion between the democrats and liberals to enter the assembly again. Having allied himself with the republican and socialist Struve, and taken an active part in a meeting at Offenburg (Sept. 12, 1847), where the radical programme was drawn up, he was about to be tried for treason, but was allowed to retain his place in the chamber, where he continued to be the leader of the extreme left. He was a member of the provisional Frankfurt parliament in 1848, but as his party was here left in the minority, he became a leader with Struve of the insurrection of April in the south of Baden, the object of which was the republicanizing of Germany. The gathering at Donaueschingen, however, which they announced by proclamation from Constance, proved a to-

tal failure; Hecker and Struve were beaten at Kandern; Freiburg, which the insurrectionists had occupied, was retaken by the government troops; and a legion of German volunteers from France, led by Herwegh, was dispersed at Dossenbach. Hecker fled into Switzerland, where he established the *Volksfreund*. In September he emigrated to America, but was recalled by the provisional government of Baden in 1849. In July he arrived in Strasburg, but, finding that the revolutionary party had been completely defeated, returned to the United States, where he became a farmer in Belleville, Ill. He commanded a regiment during the civil war, was wounded at Chancellorsville, and retired to his farm soon after the battle of Chattanooga.

HECKER, Isaac Thomas, an American clergyman, born in New York, Dec. 18, 1819. He became connected in 1843 with the Brook Farm association at West Roxbury, Mass., and subsequently spent some time with the "conscience family" at Fruitlands, in Worcester co., Mass. In 1845 he was received into the Roman Catholic church, and in 1847 became a member of the congregation of the Most Holy Redeemer. He was ordained priest in London in 1849, and after two years of missionary labor in England he returned to New York. In 1857 he and several of his brother Redemptorists were released from obedience to their order, and founded, with the approbation of the archbishop of New York, a missionary society since known as the congregation of St. Paul the Apostle (commonly called Paulists), having its first house in New York city. In 1865 Father Hecker established the "Catholic World," a monthly magazine. In 1869 he was present at the Vatican council as procurator of Bishop Rosecrans, of Columbus, O. In 1873, on account of ill health, he travelled in Europe and the East. He is the author of "Questions of the Soul" (12mo, New York, 1855) and "Aspirations of Nature" (1857).

HECKEWELDER, John, a Moravian missionary, born in Bedford, England, March 12, 1743, died in Bethlehem, Pa., Jan. 21, 1823. At the age of 12 he came with his father to Pennsylvania. He accompanied Mr. Post in 1762 in his expedition to the Indian tribes on the Ohio, and in 1771 took up his residence among them as a missionary. After 40 years of missionary service, he went to Bethlehem, the principal establishment of the Moravians in America,

and there remained till his death. He wrote several memoirs on the Delaware and Mohegan Indians, the principal one being published in the "Transactions" of the philosophical society of Pennsylvania (1819). See Rondthaler's "Life of Heckewelder" (Philadelphia, 1847).

HECLA, or *Hekla*, a volcanic mountain of Iceland, situated in the southwestern part of the island, in the district of Rangarvalla, 40 m. from the coast. Hecla rises to the height of 5,104 ft., to the eastward of a large and comparatively fertile plain intersected by the rivers Hvita and Thjorsa. Its approach is over vast lava beds lying irregularly one above the other. The peak or cone itself surmounts a long palagonite ridge 2,000 ft. high, running N. E. and S. W., and forming in reality a single volcanic fissure along which the points of eruption are continually changing. It is the middle one of five main ridges composing the Hecla system, all



Mount Hecla.

dominated by the conical crest of the volcano. This is built up with scorïæ, slag, and ashes, kept together by the streams of lava. Though above the snow limit (in Iceland from 2,000 to 2,500 ft. above the sea), it is not entirely covered with snow in summer. Down the western side slopes a snow *fond* of considerable dimensions. The top of the mountain is nearly flat, forming a broad table a quarter of a mile long by 50 rods across. The ground feels warm; on digging to the depth of six inches smoke bursts forth, and smoking heaps of lava are scattered over the surface. There are five craters on the peak, four of them on its side. The highest, on the summit, has been quiescent for ages. It is an irregular chasm about a quarter of a mile long, 300 ft. wide, and 250 ft. deep. The bottom is covered with volcanic sand, moist earth, and in some places with snow; but from many fissures on its sides issue smoke and hot steam. The recent craters are filled with black smoke, red scorïæ, and sulphur.

Of the 86 volcanic outbursts to which Iceland has been subjected since 874, Hecla has contributed 39, Katla 13, and the submarine volcano off Cape Reykjanes 12. The longest period of Hecla's inactivity has been 79 years, and the shortest 6; but the violence of the eruption bears no proportion to the preceding period of rest. The first recorded outbreak of Hecla occurred in 1004, the last in 1845. The most disastrous began on April 6, 1766, when enormous columns of ashes were discharged, accompanied with thunder and lightning, and in the space of two hours destroyed five farm houses in the valley of Rangadalsr; scoriæ of two feet in circumference were hurled two miles, large extents of birch copse were buried, and the pastures almost utterly ruined; thick masses of slag and scoriæ covered the surface of the distant Thjorsa and dammed up the Ranga river, causing the lowlands to be inundated; and the prodigious quantities of loose volcanic matter which these rivers bore down to the sea hindered the progress of the fishing boats, and covered the southern coast for 20 miles, in some places to a depth of two feet. At noon of the first day a strong southerly wind carried these ashes toward the northern districts, turning the daylight into pitchy darkness, while deafening reports reverberated over the island. On April 9 a stream of lava poured down toward the southwest, issuing from two craters, one on the summit, and another toward the southwest. On the 21st the column of ashes from the main craters rose to a height of 17,000 ft. Continuous and disastrous shocks of earthquake accompanied the eruption. Epidemics raged among human beings and cattle; and great quantities of snow fell, accompanied by storms from the northwest, which lasted a week. The eruption of 1845 was preceded by unusual atmospheric conditions. The snow patches on Hecla's ridge had diminished in a marked way during the summer; the hot springs to the southeast of the mountain had increased in numbers and activity. On the morning of Sept. 2 dull detonations were heard, and a slight vibration of the earth was perceptible, the summit of Hecla remaining shrouded in black clouds, which about noon spread over the whole sky, discharging a thick rain of yellowish gray, slaggy pieces. At noon it was dark as in the deepest winter night; then a dark, shining volcanic sand began to fall, lasting until noon on the 3d. Sounds as of cannonading were heard at a great distance, and terrific crashes in the vicinity, which were succeeded by regular detonations, and then a violent rumbling noise. Exhalations, brightly illumined by the glowing mass in the crater, canopied the ridge, as if a steadily increasing sheet of flame shot out from the summit, amid which glowing masses of stone were continually hurled up and down. At nightfall on the 2d a lava stream issued from the N. W. side of Hecla; the watercourses to the west were suddenly swollen by the melted

snows, and carried down vast quantities of mud, earth, and stone. Ships in the neighborhood of the Faroes, the Shetlands, and the Orkneys were overtaken on the 2d and 3d by a shower of ashes coming from the northwest. The flow of lava continued with slight intermissions till April 5, and on the following day the last column of ashes was discharged. As the lava only covered the track of former eruptions, no dwellings were destroyed. Sheep and cattle suffered severely from want of grass. The lava stream poured forth in 1845-'6 is 9 m. long, 2 m. broad in some places, and from 50 to 100 ft. high.

HECTOR, a Trojan hero, and the noblest character of the Iliad. He was the eldest son of Priam and Hecuba, the husband of Andromache, and the father of Astyanax. He disapproved of the conduct of Paris, and advised the surrender of Helen to Menelaus; but when his remonstrances and warnings were disregarded, he devoted all his energies to the service of his native city. After fighting some of the bravest of the Hellenic warriors, and among others slaying Patroclus, the friend of Achilles, he was at length vanquished and killed by the latter, who dragged his corpse to the Greek fleet, or according to later tradition thrice around the walls of Troy; but afterward relenting, he restored it for a ransom to Priam.

HECUBA (Gr. Ἑκάβη), a daughter of Dymas of Phrygia, or of Cisseus, king of Thrace, second wife of Priam, king of Troy, and the mother of Hector, Paris, Cassandra, Creüsa, and 15 other children. According to Euripides, she was enslaved by the Greeks after the capture of Troy, and carried to the Thracian Chersonesus, where she saw on the same day her daughter Polyxena sacrificed and the body of her youngest son Polydorus cast on the shore after he had been murdered by Polymestor, king of the Chersonesus. She determined on revenge, and, sending for Polymestor and his two sons, under pretence of wanting to inform them of hidden treasure, she slew the children on their arrival, and tore out the eyes of their father. According to other accounts, she became the slave of Ulysses, and in despair killed herself by leaping into the sea.

HEDDING, Elijah, an American bishop, born at Pine Plains, N. Y., June 7, 1780, died in Poughkeepsie, April 9, 1852. He became a member of the Methodist Episcopal church in 1798, and commenced his labors as an itinerant preacher on Essex circuit, Vermont. He was received into the New York annual conference in 1801, and sent to Plattsburgh. In 1802 he labored on the Fletcher circuit, Vermont, which then extended from the Onion river to 15 or 20 miles beyond the Canada line, including all the territory between the Green mountains and Lake Champlain. Here he was accustomed to travel 300 miles a month on horseback, to ford rivers, to sleep in log cabins, and to preach once and often two or three times daily. In 1803 he was sent to Bridgewater circuit, New

Hampshire, which then embraced 13 towns. In 1804 he was at Hanover, N. H.; in 1805 at Barre, Vt.; and in 1806 at Cheshire, Vt. During 1807-'9 he was presiding elder of the New Hampshire and New London districts. In 1808 he was a delegate to the general conference at Baltimore, and took an active part in the discussion of the policy of a delegated general conference. From 1809 to 1816 he preached in Nantucket, Lynn, and Boston, and from 1816 to 1824 in Portland, Lynn, and New London, being also superintendent of the Boston district. In 1824 he was elected bishop. During the 26 years of his administration he was distinguished for his clear and comprehensive views of the doctrines and polity of the church, and for his intimate acquaintance with ecclesiastical law. His manual on the "Discipline" is of high authority. In 1848 he was chosen to represent the Methodist Episcopal church in the British conference. He was one of the chief movers in the founding at Boston of "Zion's Herald," the first journal of the Methodist Episcopal church of the United States.—See "Life and Times of the Rev. E. Hedding, D. D.," by D. W. Clark, D. D. (New York, 1855).

HEDGE, a fence of living plants, designed for protection or for ornament. Hedges are seldom over 5 or 6 ft. high, and are kept low and compact by annual trimming; where trees are set near together and allowed to grow tall, to protect buildings or crops from prevailing winds, they are called screens and wind breaks. In the early attempts in this country at hedging, English examples were followed in forming the hedge and in selecting the plants; these resulted so generally in failure that this method of fencing fell into disrepute, and for many years was almost entirely abandoned. With the settlement of the woodless prairies the practice of hedging was revived, and it is at present receiving much attention, many miles being set annually in some of the western states; and it is becoming extensively adopted in some of the older states. In certain parts of Delaware and Maryland one may travel all day over the country roads and see but few fences. The hawthorn, so generally used for hedges in England, is entirely worthless in this country; its foliage appears late, becomes injured by the hot sun, and falls early, and the plant is badly infested by various insects; our several native thorns are but little better. For a protecting hedge there are but two plants employed to much extent in the northern and two others in the southern states. The Osage orange is more used than any other plant. This, the *Maclura aurantiaca*, also called bodock or *bois d'arc* in the southwest, where it is native, is a handsome tree, with glossy leaves and a fruit in structure like a dry mulberry, of the size and shape of an orange. The seed, obtained by rotting the balls and washing away the pulp, is scalded and kept warm and moist until it sprouts; it is then sown in rows and kept well cultivated during the season; at

the north the plants are taken up in the autumn, assorted, and buried in a dry place. The hedge row being well prepared, the plants are set the following spring six inches to a foot apart, first shortening both top and root. It is impossible to make a good hedge unless the plants are carefully cultivated and kept free from weeds until the hedge is formed. The after treatment varies. Some form the hedge by a systematic cutting made each year to induce a dense growth at the base; this course requires five years to form the hedge. The other method is to allow the plants to grow without pruning for three or four years, when they are laid down or lopped; the stem of each is cut half way through close to the base, and the top laid down on the ground, each plant being bent down upon the preceding one; this is done in spring, and by autumn an abundance of new shoots will have formed an impenetrable thicket, which is brought into proper shape by trimming.—The Osage orange is hardy in the climate of New York city, but in much colder localities the most serviceable hedge plant is the honey locust, *Gleditsia triacanthos*, also called three-thorned acacia, a well known tree of the *leguminosæ*. (See HONEY LOCUST.) The seeds, if scalded before sowing, germinate readily; they are sown in a seed bed, and the following spring the plants are set in the hedge rows; they are brought into shape by annual cutting back. Several years ago there was much discussion as to the use of white willow as a hedge plant, but it is better fitted to form a windbreak. At the south one of the best hedge plants is the pyracanth or evergreen thorn, *crataegus pyracantha*, from southern Europe; it has dense, dark-green foliage, white blossoms, and brilliant scarlet fruit; it is propagated by cuttings and by seeds, which germinate slowly. This variety is not hardy at the north, but one with light-colored fruit, lately introduced, survives the winter near New York. The Macartney rose, *rosa bracteata*, is a favorite at the south, as it forms an impenetrable barrier to animals, and is almost constantly in bloom. The buckthorn, *rhamnus catharticus*, and the common barberry, *berberis vulgaris*, are used for hedges to a limited extent. For ornamental hedges, in which great powers of resistance are not required, a large number of plants may be used; almost any shrub or tree which grows tall enough may by proper pruning be made to serve. Among evergreens, the most elegant hedge plant is the hemlock spruce, *abies Canadensis*. The Norway spruce, *A. excelsa*, and the arbor vitae, *thuja occidentalis*, are also frequently employed. At the south the holly, English and Portugal laurels, and many other broad-leaved evergreens, including the camellia, are set in hedge rows. Of the deciduous plants, the privet, *ligustrum vulgare*, the Japan quince, *cydonia Japonica*, and even the beech and other forest trees, and the pear and other fruit trees, are sometimes used.

HEDGE, Frederick Henry, an American clergyman, born in Cambridge, Mass., Dec. 12, 1805. His father was for a long time professor of logic and metaphysics in Harvard college. In 1818 the son accompanied Mr. George Bancroft to Germany, and there studied at Ilfeld and Schulpforte. In 1823 he returned to America, and in 1825 graduated at Harvard college. After three years of study in the theological school, he entered the ministry in 1828, and was settled in the Congregational church at West Cambridge. He became pastor of the Unitarian church in Bangor, Me., in 1835, of the Westminster church in Providence, R. I., in 1850, and of the first Congregational church in Brookline, Mass., in 1856. In 1847-'8 he made the tour of Europe, revisiting Germany, and spending a winter in Italy. In 1852 he received from Harvard college the degree of D. D., and in 1857 was chosen professor of ecclesiastical history in the theological school in Cambridge. In the same year he took charge of the "Christian Examiner," then the organ of the Unitarian body. In 1859 he was made president of the American Unitarian association. In the same year he was chosen by the Germans of Boston to deliver an oration on the centennial anniversary of Schiller's birth (Nov. 10). In 1866 he gave at the annual commencement of Harvard college an address to the alumni, in which he advocated changes in the system of study which have since been partially adopted by the government of that university. In 1872 he was appointed professor of German at Harvard, an office which he still holds (1874). His largest work is the "Prose Writers of Germany" (8vo, Philadelphia, 1848), in which extracts from 28 authors, from Luther to Chamisso, are given, each series preceded by a careful original sketch of the author and estimate of his genius and influence. A large portion of the extracts were translated for the work by the compiler. Dr. Hedge has also published versions of many of the minor poems of eminent German writers, especially Schiller and Goethe. In 1853, in connection with the Rev. Dr. Huntington of Boston, he published a volume of hymns, many of the best of which are his own compositions and translations. In the same year also appeared his "Liturgy for the Use of the Church." In 1865 he published "Reason in Religion," a collection of essays on the philosophy of religion, which has passed through several editions. In 1870 appeared his "Primeval World of Hebrew Tradition," of which a German translation was published at Berlin in 1873. He has also published many sermons, orations, and reviews.

HEDGEHOG, an insectivorous mammal, of the genus *erinaceus* (Linn.). The teeth are 36 in number, but have been differently divided by zoologists. F. Cuvier gives the following: incisors $\frac{3}{1}-\frac{3}{1}$, canines none, false molars $\frac{3}{1}-\frac{3}{1}$, and true molars $\frac{4}{1}-\frac{4}{1}$; according to Owen, they are developed as incisors $\frac{3}{1}-\frac{3}{1}$, premolars $\frac{3}{1}-\frac{3}{1}$, and molars $\frac{3}{1}-\frac{3}{1}$. The central incisors of the upper

jaw are separated from each other, those of the lower nearly touching; behind the first upper incisor on each side are two small single-rooted teeth, resembling false molars, but evidently incisors from their development in the intermaxillary bone; after these, and separated from them by a small interval, are three false molars, the first the largest; then the four true molars, the second the largest, the fourth very small, and all tuberculated; in the lower jaw, after the single incisor of each side, are three small single-pointed and single-rooted teeth resembling false molars, and after these, with a short interval, four molars, the second and third the largest; the crowns of the teeth lock into each other, as in other animals preying chiefly on insects. When full grown, the common hedgehog (*E. Europæus*, Linn.) is about 9 in. long, of a heavy form, short limbs, and slow plantigrade motion; the upper part of the body is covered with sharp prickles, about an inch long, arranged in clusters, divergent and



Hedgehog (*Erinaceus Europæus*).

crossing each other, of a brownish black with a white point; the head is clothed with harsh brownish hairs, and the under parts of the body with a dirty white fur; the ears and tail are short; the paws, end of nose, and tail are nearly naked; the eyes are prominent, and the opening of the ears may be closed by a valvular arrangement of the cartilages; the nose is considerably longer than the jaws, and fringed at the end; the lips are entire, and there are no cheek pouches; the five toes are armed with long nails, the middle the longest, suitable for digging; the soles are covered with naked tubercles, possessing an exquisite sense of touch; the mammae are ten, six pectoral and four ventral. By means of the development of the *panniculus carnosus* muscle, belonging entirely to the skin, the animal is able to roll itself into a ball, and preserve this attitude as long as it pleases without much effort, presenting to its enemies a thorny mass which the most voracious and powerful dare not attack. The hedgehog is nocturnal, concealing itself during the day in burrows or natural holes, coming out at

night in search of worms, insects, snails, roots, and fruits; though possessing very limited intelligence, it has been so far domesticated as to be brought up in gardens, where it proves of great service in destroying noxious insects; the flesh is said to be good eating. The young are born in May, covered with prickles, with eyes and ears closed, and about two inches long. When at rest, the hedgehog has the power of lowering the prickles, and of retaining them smooth on a level with the body. This species occurs throughout temperate Europe, and was well known to the ancients. The popular name urchin and the French *hérisson* are evidently derived from the Latin *ericus*, of which *erinaceus* is a synonyme; it is the *ερίκος* of the Greeks. The prickles were formerly used to hatchel hemp. A second species, the long-eared hedgehog (*E. auritus*, Pall.), is found in the eastern regions of the Russian empire; the ears are nearly as long as the head; the body and limbs are more slender, and the under hair finer, than in the preceding species. Like the other hedgehog, it hibernates in winter in holes a few inches below the surface of the ground; it can eat cantharides and other vesicating insects with impunity; it grows very fat in autumn, preparatory to hibernating. Other species are described. There is no proper hedgehog in America; the rodent porcupine, similarly armed with quills, is erroneously so called in some parts of the United States.

HEDJAZ, a dependency of the Turkish empire in Arabia, on the coast of the Red sea, bounded N. by the desert, E. by the desert, Shomer, and Nedjed, S. by Yemen, and W. by the Red sea, and its arm the gulf of Akabah. The coast is generally low and sandy, and lined with coral reefs and islets, which afford shelter for small vessels in all weather. Large vessels find good anchorage in roadsteads, but there are few safe harbors. The principal seaports are Jiddah and Yembo, the former the port of Mecca, the latter of Medina. A range of mountains which attain in some places an elevation of 8,000 ft., often covered with snow, traverses Hedjaz from N. to S. and extends into Yemen. West of this chain, which is generally visible from the coast, and sometimes approaches near to it, is a tract of sandy lowland (el-Tehama), once the bed of the sea; east of it is a highland (*nejed*), which recedes gradually into the desert, excepting near lat. 24°, where an offshoot from the range extends N. E. to Jebel Shomer. These mountains are of granitic formation, but porphyritic rocks, supporting sandstone and limestone, occur in many places. Traces of volcanic fires are numerous throughout the Tehama, and porous lavas are found, particularly around Medina. The lowlands are scored by wadies or beds of torrents, which are rarely filled, as but little rain falls during the year. There are no rivers, but a few small streams find their way down from the mountains, where there are more copious rains and consequently well watered val-

leys. In the Tehama the wild plants are few and offer little sustenance for animal life. In the uplands, various cereals, many fruits, and the vegetables peculiar to Arabia are raised. Wild goats abound in the mountains, and hyænas and foxes are numerous along the coasts, where they subsist on fish which they find on the coral reefs. A few gazelles, hares, jerboas, and lizards are found on the plains. Falcons are the principal birds. Fish are very plentiful, and constitute a large part of the food of the inhabitants; great quantities are salted and sold in the markets of Mecca. Three species of dolphin are taken along the coast, and tortoise shell and mother of pearl are abundant. The climate of Hedjaz is generally unhealthy. Fevers are prevalent on the coast, owing to the foulness of the water; and in the interior the humidity and rank vegetation of the irrigated valleys render them almost equally insalubrious. The heat is excessive, and is tempered only by the sea breeze. The N. part of Hedjaz has few towns or villages, and is inhabited chiefly by wandering Bedouins. The pilgrim route from the north to the holy cities is guarded by isolated castles. At the N. extremity of the gulf of Akabah is the fortified village of the same name. In the S. part Medina and Mecca are the chief inland places. Tayf, about 60 m. S. E. of Mecca, is on high ground, and is defended by several forts; it supplies Jiddah and Mecca with fruits, which grow abundantly in its vicinity. Gunfudah is a coast town S. of Jiddah, opposite a group of islands of the same name. Kali, another small coast town further S., in lat. 18° 35' N., is on the borders of Yemen. Besides these places there are only a few scattering villages, mostly in the highlands.—The country immediately around Mecca is under the jurisdiction of the sherif of Mecca, an officer elected by the sherifs, or nobles who claim descent from the family of the prophet; but he is subordinate to the representative of the sultan, who resides at Jiddah. When the Wahabees cut off the communication between Constantinople and the sacred cities, the sherif of Mecca revolted, attacked the Turkish pasha in Jiddah, and removed him by poison. The Wahabees soon checked his increasing power, and they in turn were driven east in 1818 by the troops of Mehemet Ali, who made himself master of Hedjaz and assumed the protectorate of the holy cities. At the close of the war between Turkey and Egypt in 1840, the sultan recovered his rights, and Hedjaz now constitutes a vilayet of the Turkish empire. The great caravans of pilgrims, which were frequently intercepted and despoiled when the country was in an unsettled state, are now comparatively protected, although still subject to numerous extortions.

HEEMSKERK. See HEMSKERK.

HEER, Oswald, a Swiss naturalist, born at Glarus, Aug. 31, 1819. He went to Zürich in 1832, and has been engaged there for more than 30 years as professor of botany and en-

tomology, and as director of the botanical garden, which he helped to establish. He was likewise for upward of 20 years a member of the great council of Zürich. He has published *Die Käfer der Schweiz* (2 vols., Solothurn, 1837-'40); *Fauna Coleopterorum Helvetica* (3 vols., Zürich, 1839-'41); *Die Insektenfauna der Tertiärgebilde von Oeningen und von Rodoboj in Kroatien* (3 vols., Leipsic, 1847-'53); *Flora tertiaria Helvetica* (3 vols., Winterthur, 1854-'6); *Die Pflanzen der Pfahlbauten* (Zürich, 1865); *Die Urwelt der Schweiz* (1869; French translation by Demole, Geneva and Basel, 1872); and *Die fossile Flora der Polarländer* (2 vols., Winterthur, 1861-'7).

HEEREN, Arnold Hermann Ludwig, a German historian, born at Arbergen, near Bremen, Oct. 25, 1760, died in Göttingen, March 7, 1842. He studied at Bremen and at Göttingen under the guidance of Heyne, whose daughter he afterward married, and of Spittler, and was appointed professor of philosophy, and in 1801 of history, at Göttingen. He was for some time one of the editors of the *Bibliothek der alten Literatur und Kunst*, and after the death of J. G. Eichhorn in 1827 edited the *Göttinger gelehrte Anzeigen*. The subject of his lectures at the university was chiefly the history of Greek and Roman antiquities and of literature, and a principal merit of his numerous historical writings consists in an original elucidation of the commercial affairs and relations, as well as of the origin and political development, of the ancient states. Besides the edition of Meander's *De Encomiis* (1785), and the *Eclogæ Physicæ et Ethicæ* of Stobæus (4 vols., 1792-1801), the following are his most important works: *Ideen über die Politik, den Verkehr und den Handel der vornehmsten Völker der alten Welt* (2 vols., 1793-'6; 4th ed., 6 vols., 1824-'6; the part relating to Greece translated into English by George Bancroft, Boston, 1824); *Geschichte des Studiums der classischen Literatur seit dem Wiederaufleben der Wissenschaften* (2 vols., 1797-1802; 7th ed., 1822); *Handbuch der Geschichte der Staaten des Alterthums* (1799; 5th ed., 1826; translated by Bancroft, Northampton, 1828); *Geschichte des europäischen Staatensystems und seiner Colonien* (1809; 5th ed., 1830; translated by Bancroft, Northampton, 1829); *De Fontibus et Auctoritate Vitarum Parallelarum Plutarchi* (1820); all of which were published in Göttingen, where also a collection of his historical works appeared in 15 volumes (1821-'6). Among his minor writings are sketches of Johannes von Müller, Spittler, and Heyne, a treatise on the influence of the Normans upon the French language and literature, and a dissertation on the crusades. His "Ideas" were translated into English, and published at Oxford by Talboys, under the title of "Historical Researches." A uniform edition of his translated works, under the title of "Heeren's Historical Researches," has been published by Bohn (7 vols., London, 1846-'54).

HEFELE, Karl Joseph von, a German historian, born at Unterkochen, Württemberg, March 15, 1809. He studied at Ellwangen and Ehingen, graduated in 1834 at the university of Tübingen, and became in 1840 professor of theology there, lecturing successively on church history, Christian archaeology, and patristics. From 1842 to 1845 he was a member of the Württemberg chamber of deputies. He was consecrated bishop of Rottenburg in 1869, and in the council of the Vatican maintained the inopportune-ness of defining the pope's official infallibility, but accepted the doctrine when it was defined. He has strenuously opposed the new legislation in Germany relating to the religious orders and the relations of church and state. His most important works are: *Die Einführung des Christenthums im südwestlichen Deutschland* (Tübingen, 1837); *Patrum Apostolicorum Opera* (1839; 4th ed., 1856); *Das Sendschreiben des Apostels Barnabas* (1840); *Der Cardinal Ximenes und die kirchlichen Zustände Spaniens im 15. Jahrhundert* (2 vols., 1844; 2d ed., 1851; English translation by Canon Dalton, London, 1860); *Chrysostomus-Postille*, selections from Chrysostom (1845-'57); *Concilien-geschichte* (7 vols., Freiburg, 1855-'74; English translation of part i. by W. R. Clark, Edinburgh, 1871); *Beiträge zur Kirchengeschichte, Archäologie und Liturgik* (2 vols., 1864-'75); and *Die Honorius-Frage* (1870).

HEGEL, Georg Wilhelm Friedrich, a German philosopher, born in Stuttgart, Aug. 27, 1770, died in Berlin, Nov. 14, 1831. From his 8th to his 18th year he was thoroughly trained in philology, mathematics, and history, in the gymnasium of his native town. His scholarship was already productive. He began a system, which he never abandoned, of making and arranging copious extracts from all the books and even journals that he read; and he was always a great reader of newspapers. In 1788 he became a student of theology at Tübingen, having a stipend on a ducal foundation. He heard Storr on dogmatics, Schnurrer in exegesis, Flatt in philosophy; and was also well taught in botany, anatomy, and other sciences of observation. With some of the students he read Plato and Kant; but his subsequent philosophical fame took them by surprise. In 1790 Schelling, then 15 years old, went to Tübingen; he and Hegel studied, talked, and roomed together, little aware of that strange destiny by which the younger became the leader of the elder, and the elder supplanted the younger, and the younger again succeeded the elder in the development of German idealism. After quitting the university, Hegel (like Kant and Fichte) was for a long time a tutor in private families; from 1793 to 1796 at Bern in Switzerland, and from 1797 to 1800 in a more eligible position at Frankfort-on-the-Main. His studies meanwhile took a wide range. He read Thucydides, Montesquieu, Gibbon, and Hume, and thoroughly pondered the Greek and German metaphysics. He be-

gan a "Life of Christ;" wrote and rewrote a "Criticism of Religious Ideas;" and corresponded with Schelling about his essay on the Ego (*Vom Ich*), which was stirring the pulses of ardent thinkers. He passed through, in his own experience, the conflict between the older supernaturalism and the prevalent rationalism, neither of which harmonized with his speculative tendencies. Yet, to the end of his life, he professed accordance with the Lutheran orthodoxy, and one of his later public addresses was a eulogy upon the principles of the Augsburg Confession, pronounced as rector of the Berlin university upon the tricentennial celebration in 1830 of the adoption of that instrument. Before 1800 he had drawn up the outline of a system of philosophy in three parts: the first on logic and metaphysics combined; the second on the philosophy of nature; the third on the philosophy of mind or spirit. Here was already foreshadowed that identification of logic and metaphysics which is one of the marked peculiarities of the Hegelian system. But as yet he had not clearly mastered the idea or the method of his scheme; he needed sharper thought and conflict to know whereto all this study was to grow. Hegel's father died in 1799, leaving him a patrimony of 3,000 florins, and he at once determined to devote himself to philosophy at Jena. This university had been made illustrious in literature by the new romantic school of the Schlegels, Novalis, and Tieck; Fichte had just been driven thence to Berlin on the accusation of atheism; Schelling was now there, arousing the enthusiasm of the novices in the mystery and marvel of the new philosophical intuition; and here, too, Fries, Krause, and Ast were commencing their fruitful philosophical career. To the philosophical world Hegel presented as his introduction an essay on the "Difference between Fichte and Schelling," advocating, more definitely than the latter had done, the position that this difference was not adequately designated by saying that the former taught a subjective and the latter an objective idealism, but rather that Schelling's system included both. This was published in the spring of 1801; in the autumn its author became tutor in the university. His dissertation on his appointment was *De Orbitis Planetarum*, a zealous advocacy of the German Kepler against the English Newton, containing also an unlucky polemic against Bode's law about the proportional distances of the planets; he went so far as to suggest that, according to the true law, the space between Mars and Jupiter should not be filled up, ignorant that Piazzi had already discovered the asteroid Ceres. From 1801 to 1806 (in which last year he became professor) he lectured on logic, the philosophy of nature, psychology, ethics, &c. His first course was given to four auditors. Awkward in his delivery, encumbered by his thoughts, he failed to interest any but the most thoughtful. "He thinks in substantives," said one of his audi-

tors; often the structure of his sentences was incomplete. Carrying to his lecture a mass of loose papers, he would fumble among them, arranging them dialectically, under his rigid categories, as he went along. But as his "dry light" became warm, his eye and voice would grow keen, and he would often break out into an aphorism, a sarcasm, or a pregnant antithesis, long to be repeated. His best manuscripts were copied from the students' notes. At Jena, too, in conjunction with Schelling, he edited the *Kritisches Journal der Philosophie*; and these two philosophers were still so nearly agreed, that the authorship of one of the most important articles was afterward claimed by both; it is on the "Relation of the Philosophy of Nature to Philosophy in General," and is included in Hegel's works. Hegel's lectures at this period on the philosophy of history contain some of the strongest statements, afterward modified, implying a pantheistic confusion of God and the world. But even then God was to him, not a mere substance (as in Spinoza), but a subject, and as such spiritual, the absolute spirit. The statement that Hegel identified God and nothing, and that this is the sense of the system, is an entire misconception. His career in Jena was brought to a close by the French invasion of 1806. In the turmoil of that campaign, his chief solicitude was about the fate of some of the last sheets of his "Phenomenology," which he was sending to a publisher in Bamberg. The manuscript was saved, but the philosopher's house was sacked by French troops, and he was reduced to his last penny. In 1807-'8 he was editor of a political sheet in Bamberg, and there he projected a work on the political constitution of Germany, which was never completed. At Nuremberg he was rector of the gymnasium from 1808 to 1816, and gave philosophical lectures to the lads, issued as the 18th volume of his collected writings under the title *Propädeutik*—a simple, clear outline of the main points of his general system, in a style as popular as the abstruse subject admits. His administrative ability was here seen to be of a high order; he was ever punctilious as to all fit rules and observances. In September, 1811, he married Marie von Tucher, of an ancient Nuremberg family, 22 years his junior—a lady of refinement, decided in her Christian convictions, indefatigable in her daily charities, to whom he was attached with singular love and tenderness. To his constant friend Niehammer he wrote that "when a man has found a position and a wife that he loves, he is quite complete for life." Often would he praise her in verse, and his best letters are those he wrote her on his journeys. Two sons, Karl and Immanuel, were born to them. His domestic affairs were carefully arranged; his family life was one of unbroken peace; and it may have mitigated, as in the case of Comte, the abstractions of his system. Some of the severest parts of his "Logic," as the writer happens to

know, were written while he was watching as a nurse at the bedside of his wife. Hegel's "Phenomenology," which he used to call his "voyage of discovery," was issued at Bamberg in 1807. The object of this work is to describe the stages and process through which the mind must proceed from the simplest form of consciousness up to absolute knowledge; and to exhibit this, not merely as a matter of fact, but also as a (logically) necessary ascent. One of his disciples says that in this most finished of his writings he is the Dante of philosophy, since he shows how consciousness passes from the inferno of sense, through the purgatory of the understanding, into the paradise of philosophic freedom. In principle and method it is a protest against Schelling's imagination of a special intellectual intuition. The absolute is not "shot out all at once, like a ball from a pistol;" it is, and it is attained by, a process. The stadia of this process are, simple consciousness, self-consciousness, reason, spirit (here used as equivalent to objective morality), religion (including art), and absolute knowledge. The process itself is necessary; the method is immanent in thought. Its moving principle is that of contradiction or negation. Each lower stage is contradicted or negated in thought; this negation does not give zero as its result, but rather an opposite or antagonistic principle; and these antagonistic principles struggle through (the negation of the negation) to a higher unity; and so on, until we arrive at that absolute knowledge which is the result as it was the source of these evolutions, in which all these antagonisms are both abolished and preserved. Arrived at this state of knowledge, the spirit knows itself to be identical with universal reason; the finite self-consciousness and the absolute self-consciousness are one; the infinite is no longer foreign to and outside of the finite. With a knowledge of this high consummation, the race enters upon a new epoch; the old has passed away; the conflicts of all the schools are adjusted. Man knows the absolute reason; the absolute reason knows itself in man. To this all history, all thought have been tending; the history of thought is this very process; the completion of thought is found in the science of the absolute. Such was the daring prophecy with which a secluded student, in the ancient and quiet city of Nuremberg, heralded a revolution in the world of mind. Nor did he stop with the proclamation. In his "Logic," published in two volumes, three parts, between March, 1812, and July, 1816, he developed his system in its most rigorous and abstract form. This is one of the boldest and subtlest works of human speculation. It is designed to answer the question to which the "Phenomenology" led, viz.: What is that absolute knowledge which has been shown to be necessary? It is the completion of the system of categories, which Kant had elaborated, after Aristotle. It is not logic alone, nor metaphysics alone; it is both to-

gether. It is not the science of thought alone, nor that of being alone; it is the science of both thought and being, viewed as identical and pervaded by the same logical law. The whole system is reason itself, or the absolute idea—absolute idealism. The terms logic, idea, and reason are used in an unusual, in a universal sense. Reason and idea are not merely subjective; logic gives the law of being as well as of thought. That Hegel reduced all knowledge to that of mere relations and all being to mere logic, is an entire misconception of his theory. The system of logic, as the first part of philosophy, contemplates reason (the idea) as it is in itself, and not in its manifestations. Hegel used to call it "the kingdom of the shades;" his "voyage of discovery" led him first into this kingdom. He also speaks of it as equivalent to "God in his eternal being, before the finite world was created." In Platonic phrase, it is the ideas of the Divine mind, before they assume finite forms and modes. These ideas (this idea) are developed by an immanent law, the dialectic process of which we have spoken above; and herein consists the peculiarity of the work. The process is that of the idea itself, and all that we can do in the matter is to stand by and see how it is done; though there must be "speculation in the eyes" that see this process carried through and out. Thus, we begin with the conception of being, the most universal and indeterminate of all. As entirely indeterminate, it is the same as nothing. Being and nothing are thus the same, but they are also different; they are identical, but antagonistic; and, as such, they result in a process of becoming (*das Werden*), for the very idea of becoming includes being and not-being. This is ingenious and acute as an analysis of the conceptions; but is it a real or possible process in being as such? The whole science of logic is distributed into three parts—being, essence, and conception; the first two are the ontological logic, the third is the subjective logic. The categories that fall under being are three—quantity, quality, and measure. The categories under essence are also three—essence in itself, phenomena as expressing essence, and actual existence as the union of the other two. Here also, of course, come the discussions about the antinomies of the understanding. The categories of the third part of logic, that is, of conceptions or notions, are three—the subjective conception, the object, and last and highest of all, the idea. This logic, now, forms the first great division of Hegel's whole scheme of philosophy. This was fully presented, in outline, in his *Encyklopädie der philosophischen Wissenschaften*, published in 1817, in a third edition in 1830, and issued in his collected works with additional notes from his lectures. Here the categories of the "Logic" are applied to all the particular sciences. Of his whole system, the most general idea is that of God or the Absolute Spirit. This spirit is not mere substance, as in Spinoza, but also

subject, and as such contains the principle and law of its own evolution. This law is a perpetual trichotomy—thesis, antithesis, synthesis. Accordingly the "Encyclopædia" has three main parts, viz.: "Logic," the "Philosophy of Nature," and the "Philosophy of Spirit." Each of these has, again, a threefold division; and these three yet other three; and this rhythm of triads makes the harmony of the system. Logic, as we have already indicated, presents this absolute spirit or idea, as it is in itself, in its shadowy, ghostly form. In the "Philosophy of Nature" we have the same idea in its objective manifestation, in the forms of space and time. Here the idea or spirit becomes, as it were, a stranger to itself, yet this, too, by an inward necessity. How it comes to do this is one of the knots of the system; but that it does so is evident from the fact that nature is. Nature is here reconstructed—or, Hegel would say, we see how it is constructed—according to the high *a priori* method, in its three departments of mechanics, physics, and organized beings. These refined demonstrations have not had much effect upon the naturalists. But the absolute spirit, having run through the round of nature, emerges into its third sphere (in an equally recondit way), that of mind or spirit itself; spirit here finds and knows itself, of course, in three stadia. First, it is subjective spirit, including anthropology, phenomenology, and psychology. Then it passes over into objective spirit, or the sphere of ethics, which has three subdivisions: 1, law or right; 2, morality, private and personal; 3, public ethics, including the family, society, and the state. In fine, spirit becomes absolute spirit, and as such shows itself in three modes, art, religion, and philosophy; and in the last the circle is completed, the end returns to the beginning, the absolute spirit knows itself, and the Hegelian system is all in all. This "Encyclopædia" was first issued while Hegel was in Heidelberg, where he became a professor in 1816, declining invitations to Erlangen and Berlin—the latter, it is said, in part because the Prussian minister proposed that he should be examined as to his capacity for lecturing after his eight years' seclusion in Nuremberg. His fame now rose rapidly. His disciples began to be ardent and prophetic. His system was proclaimed as completing the structure of German idealism. Kant had critically prepared the way; Fichte had taught a subjective idealism; Schelling had not risen above an objective idealism; but in the absolute idealism the partial was dethroned and the universal made supreme. Cousin, passing through Heidelberg, proclaimed to the world that in Hegel (whose "Logic" he said he could not grasp) he had found a man of genius; and in his later brilliant course at Paris, in 1828, he availed himself of the generalizations and methods of the great idealist for the interpretation of history and the history of philosophy. A second invitation to

Berlin in 1818, urged by the minister Von Altenstein, Hegel's warm personal friend, was welcomed by him. He was now in the ripeness of his manhood, and animated by the consciousness that all thought had found its culmination in him. As the devoted Michelet has it, he was "the crown of the whole past and the seed of the most fruitful future." His new position was most favorable for the propagation of his opinions. Berlin university had always been enthusiastic for speculation. His lectures soon became the rage. Officers of state and the literati and savants of Berlin sat on the students' benches. The government provided liberally for his salary, and also for journeys to Paris, Holland, &c. He took the bearing of the founder of a new and great school. Hegelianism was the road to office. The master became sometimes overbearing; even Varnhagen von Ense says that he was "tyrannical." Professor Gans was one of his most zealous disciples, but Hegel called him to a sharp account for having dared to "recommend," on the university bulletin, his work on ethics. "What had he done, that Gans should recommend him!" He mixed more freely in general society, and indulged himself in his two chief relaxations, snuff-taking and card-playing. His previous lectures on the different branches of philosophy were carefully revised, and he wrote two new courses, on the "Philosophy of Religion" in 1821, and on the "Philosophy of History" in 1827, in both of these branches introducing an original and scientific elaboration of the materials. His "Outlines of the Philosophy of Right" was issued in 1821, combining in one exposition natural rights, ethics, and the philosophy of society and the state. Man's moral being expresses itself completely in the state; to this, natural rights, private morals, and even the church, are rightfully subordinate. The preface to this work aroused more controversy than the work itself, since it summed up its teachings in the noted aphorism: "The rational is actual, and the actual is rational." This was interpreted in an ultra-conservative sense; explained in any different sense, it was a mere truism. In fact, he was understood as supporting the existing Prussian system as the perfection of reason and freedom. This for a time helped his metaphysics; though his extreme disciples soon "changed all that." He used to fight his battles in his prefaces. In a preface he declared against the position of Schleiermacher, that the feeling of absolute dependence is the essence of religion. These two men were then at the height of their fame, both at Berlin; neither liked the other, and their disciples have perpetuated the struggle to the present time. The theologian opposed the admission of the philosopher into the academy of science; and the philosopher would not allow the theologian to take part in his scientific journal. The real difficulty was that Schleiermacher tried to find in human nature a foot-

hold for religion independent of philosophy, and Hegel's speculations did not allow this to be done. His system received concentration and impulse from the establishment, with the favor of government, of the Berlin *Jahrbücher für wissenschaftliche Kritik* (1827). All things were here discussed in the light of absolute knowledge. The school became haughty and uncompromising; they had solved the problem of the universe, and nothing remained but to bring all thoughts into subjection. Germany was alive with speculation; it had never known such a philosophical ferment. Even orthodox men gave in their adhesion, and Hegel was not loath to encourage them. Göschel, the jurist, wrote "Aphorisms on Science and Nescience," applying Hegelianism to the defence of the mysteries of Christianity; and Hegel reviewed the work, with an almost eager welcome, in the *Jahrbücher*, to show that his system was the same thing in the sphere of speculation that the Christian religion was in the sphere of faith. In the preface to a new edition of his "Encyclopædia," he quoted from Tholuck on the oriental trinities to show that he held to the Trinity more thoroughly than did this genial divine. The mystics he eulogized with Baader, and the theosophic Boehm he declared to be not merely fantastical, but also profound. The rationalists had no more violent foe than this prophet of the universal reason; he defended against them the truths of the incarnation, of sin, and of redemption. Conservative rationalism was indignant; the popular philosophy was dumb with amazement. There were many who said the long conflict between philosophy and faith was now to be adjusted; the absolute idealism was to do it, and it was to be done in Berlin. Enthusiastic students declared that the refined ideas of the "Logic" were "the new gods" of a new Pantheon. The triumph of his system seemed to be coming on. In 1829 he was rector of the university, and administered its affairs with the punctuality and painstaking of an accomplished disciplinarian. In 1831 Hegel published the first volume of a new edition of his "Logic," and revised for the press his lectures on the "Proof of the Being of God." In the autumn he commenced his course in the university with more than usual freshness and vigor. But cholera attacked him in its most malignant form on Nov. 13. On the next day at 5 o'clock he was dead. He was buried near Fichte and Solger, and over his remains was celebrated the worship of genius by disciples almost idolatrous.—Rosenkranz has written a full biography, from which we have derived many of our statements. Every subsequent philosophical writer of note in and out of Germany has criticised his system. The fullest accounts are in the histories of philosophy by Michelet, Erdmann, and Willm; the ablest criticisms are those of Schelling, Trendelenburg, Ulrici, Weiss, Fischer, and the younger Fichte. The Hegelian literature would make

a collection of several hundred volumes. In Holland, Van Ghert, Prof. Sieber, and Dr. Krahl espoused his system; Heiberg in Copenhagen; Tengström and Siendwall in Finland; a Hungarian wrote to him that he was learning his "Logic" by heart. Apart from the main peculiarity of his system, the impulse which this extraordinary thinker communicated to the various departments of philosophy was almost unexampled. He compelled men to think for him or against him. His "Logic" led to the treatises of Werder, Weisse, Erdmann, Trendelenburg, and Ulrici, as well as to a total revision of Schelling's system. His "Psychology" was followed by Massmann, Wirth, Erdmann, Rosenkranz, and the "Anthropology" of Daub. His "Ethics" gave a more philosophical model for this science, and produced the treatises of Von Henning, Michelet, Vatke, Daub, and Wirth, and influenced the systems of Chalybäus, Fichte, and Rothe. In the "Philosophy of History" he made the boldest attempt to construct the whole according to the evolution of the idea of freedom. His "Æsthetics" almost transformed the science, and led to the works of Weisse, Hotho, Röscher, and Vischer. In the "History of Philosophy" he first introduced the general method of treatment, followed by Marbuch, Michelet, Bayrhammer, Barchou de Penhoen, Willm, Zeller, and Schweigler; his criticism of Aristotle has contributed more than any other to the understanding of Aristotle's real metaphysical system. Even in the "Philosophy of Nature," though many of his views are not proved by observation, and though his deductions are often arbitrary, he has yet added to the materials for a truly philosophical construction of the cosmos; he early advocated Goethe's theories about colors and the metamorphosis of the plants. In jurisprudence, the conservative tendencies of his system were soon annulled by his more advanced followers, and the most radical German revolutionists of 1848 expressed their extreme views in the dialect of the absolute idealism; *e. g.*, Ruge in the *Hallische Jahrbücher* (1838). But the chief conflicts were in theology, and in the relations of his system to Christianity. Soon after his death his school fulfilled the master's prediction, and illustrated his theory of antagonisms. His lectures on the "Philosophy of Religion" were twice edited: first in a conservative sense by Marheineke, and then in a revolutionary sense by Bruno Bauer. Passages in his "History of Philosophy," from his lectures of 1805, were declared to be much more pantheistic than his matured views; Strauss thought that he was opposing Hegel until these lectures were published. The conflicting elements came out at first in discussions upon three points, the personality of God, immortality, and the person of Christ. Strauss's "Life of Jesus" (1835) brought the last decisive point to an articulate statement; and in his subsequent controversial writings he ranged

the school, after the French political pattern, in three divisions, the right, the centre, and the left. This division was first made in reference to Christianity. The right wing asserted that Hegelianism and orthodoxy were harmonious; Göschel, Gabler, Erdmann, Marheineke, and Bruno Bauer for a time, stood here. The middle was represented by Rosenkranz, Gans, and Vatke. On the left stood Michelet, Strauss, Ruge, the radicals in religious opinion, who denied immortality, the divine personality, and the incarnation as specific in the person of Christ. The Tübingen school of F. O. Baur has worked in the interests of a destructive criticism. Against all these modifications of the system the great body of the German divines, especially the school of Schleiermacher, have protested from the beginning, evidently believing that the tendencies of Hegel's speculations were pantheistic, whatever judgment might be formed about his personal opinions. The transformation of Hegelianism into naturalism by Feuerbach and others, and the direction taken by the development of the natural sciences, have placed Hegel's philosophy in the heart of the materialistic controversies of recent times. Even Hartmann's "Philosophy of the Unconscious" (1869) has embraced the main doctrines of Hegel.—The leading works of Hegel appeared in the following order: *Phänomenologie* (1807); *Logik* (1812-'16); *Encyclopädie der philosophischen Wissenschaften* (1817); *Grundlinien der Philosophie des Rechts* (1821). His collected works were published in 18 vols. in 1832-'54. Recent works of note on the Hegelian philosophy are Haym's *Hegel und seine Zeit* (Berlin, 1857); J. F. K. Rosenkranz's *Apologie Hegels gegen Dr. R. Haym*, and Dr. Aloys Schmid's *Entwicklungsgeschichte der Hegelschen Logik* (1858); F. Reiff's *Ueber die Hegelsche Dialektik* (1866); Rosenkranz's edition of the *Encyclopädie* with *Einleitung und Erläuterung*, *Hegel als deutscher Nationalphilosoph* (1870), and *Hegel's Naturphilosophie und ihre Erläuterung durch den italienischen Philosophen A. Vera* (1868); C. L. Michelet's *Hegel, der unwiderlegte Weltphilosoph*, Max Schasler's *Hegel, Populäre Gedanken aus seinen Werken*, Karl Köstlin's *Hegel in philosophischer, politischer und nationaler Beziehung für das deutsche Volk dargestellt*, and F. G. Biedermann's *Kant's Kritik der reinen Vernunft und die Hegelsche Logik* (1870); and Stirling's "Secret of Hegel" (1865). Important translations of Hegel are Ch. Bénéard's *Cours d'esthétique* (1840-'43), and *La poétique* (1855); A. Vera's *Logique* (1859), *Philosophie de la nature* (1863-'65), and *Philosophie de l'esprit* (1867-'70); and H. Sloman and J. Wallon's *La logique subjective* (1854). English translations are the "Subjective Logic," by H. Sloman and J. Wallon (1855); the "Philosophy of History," by J. Sibree, in Bohn's "Philosophical Library" (1857); and "The Logic of Hegel," translated by W. Wallace (1874). "The Jour-

nal of Speculative Philosophy" (St. Louis) contains many admirable translations and expositions of Hegel's philosophy, by W. T. Harris and others.

HEGIRA (Arabic, *hejrah*, emigration, usually but incorrectly translated "flight;" the full expression is *hejrat al-nabi*, the migration of the prophet), the migration of Mohammed from Mecca to Medina. The most probable date assigned to this event is Sept. 13, 622. Mohammed died in 632, and seven or eight years afterward the caliph Omar, with the aid of Harmozan, a Persian, instituted a new calendar founded upon the hegira. But instead of commencing the new era with the actual date of the hegira, he began it with the first day of Moharrem, the first month of the Arabic year, corresponding to July 16, 622. The Arabian astronomers maintain that it was one day earlier, but their opinion has never been adopted in either official or popular practice. This date, July 16, is in most books of chronology given erroneously as the date of the hegira itself. The Mohammedan calendar is regulated entirely by the moon, without regard to the sun or the seasons. The year consists of 12 lunar months. The odd months contain each 30 days, the even months each 29 days except in intercalary years, when the 12th month also contains 30 days. The year thus consists of 354 or 355 days. Whether a given year consists of one or the other number of days is decided as follows: the time from the commencement of the era is divided into cycles of 30 years. The year 1873, being the 1290th of the hegira, was the last year of the 43d cycle. In each of these cycles the 2d, 5th, 7th, 10th, 13th, 16th, 18th, 21st, 24th, 26th, and 29th years consist of 355 days, one day being added to the 12th month. The other years of the cycle consist each of 354 days. The Mohammedan year is thus on an average 10 days, 21 hours, and 15 seconds shorter than the tropical year, and consequently the first day of each Mohammedan year comes 10 or 11 days earlier than it did the preceding year, and thus retrogrades through all the different seasons. Hence the exact transfer of a Mohammedan date to our calendar is a very difficult and complicated operation. But the year can be fixed with sufficient accuracy in a simple manner. There are 11,694 days in 33 Mohammedan years, and 11,688 days in 32 Christian years; hence we may assume that 33 Mohammedan are equal to 32 Christian years, and we have the following rule: subtract from the year of the hegira its 33d part, and add 622; the result is the year of the Christian era. Thus to find the year corresponding to 1290 of the hegira: $1290 - 39$ (*i. e.*, $1290 \div 33$) + 622 = 1873 A. D. To turn a year of the Christian era into a year of the hegira, subtract 622 and add to the remainder the 32d part of itself. Thus Constantinople was taken by the Moslems in 1453; in what year of the hegira was it? $1453 - 622 = 831$; adding 26 (*i. e.*, $831 \div 32$), we have 857.

HEIBERG, Johann Ludwig, a Danish author, born in Copenhagen, Dec. 14, 1791, died there, Aug. 25, 1860. He entered the university in his native city in 1809 to study medicine, but in 1814 gave that up and devoted himself to dramatic literature. When 23 years old, he brought out a version of the story of Don Juan, and a play entitled "The Potter" (1814). He now familiarized himself with the Spanish drama, making a journey into Spain for that purpose, and then went to Paris, where he remained three years. On his return to Denmark in 1822, he was appointed professor at the university of Kiel. In 1824 he went to Berlin, and studied the system of Hegel and his followers, returning home in 1825. He is the most popular dramatic author of Denmark, and his plays were all translated into German by Kannegiesser. He was director of the royal

theatre in Copenhagen from 1849 to 1856, and afterward censor of the theatre. He published a complete edition of his poetical works (8 vols., 1845-'7), and one of his prose writings (3 vols., 1841-'4). An edition of his complete works was brought out after his death (22 vols., Copenhagen, 1861-'8).

HEIDELBERG (Lat. *Edelberga*; anc. *Myrtilletum*), a city of Baden, on the left bank of the Neckar, 10 m. S. E. of Mannheim, and 31 m. N. N. E. of Carlsruhe; pop. in 1871, 19,988. It is chiefly celebrated for its university, founded by the elector Rupert toward the end of the 14th century, and reformed by the grand duke Charles Rupert in 1803 under the title of Ruperto-Carolina. The university library, containing 200,000 volumes and 2,000 manuscripts, is exceedingly rich in antique works and early editions. After the capture of Hei-



Heidelberg.

delberg by Tilly in 1622, the library, which at that time numbered besides the printed books 3,500 manuscripts (exclusive of the French), was presented by the duke of Bavaria to Pope Gregory XV., and by the latter made, under the name of Bibliotheca Palatina, a special section of the Vatican library. In 1797 Napoleon gave 38 of the best manuscripts, obtained at the peace of Tolentino, to the Paris library; but in 1815 these, as well as all the Old German manuscripts of the Palatina, were restored to Heidelberg. The university is very complete in details, embracing a museum of natural history and antiquities, a physiological cabinet, a chemical laboratory, a lying-in asylum, two botanical gardens, a college of agriculture and forestry, an observatory, and a philosophical, theological, pedagogical, homiletical, and Biblical seminary. It was attended in 1873 by 707 students, under 108

professors. A chair of English literature, the first of the kind in Germany, was established in 1873. There are also an excellent gymnasium and two female schools of high reputation. The situation of Heidelberg, in a picturesque and fertile country, not far from the junction of the Neckar with the Rhine, having on one side the Königstuhl and on the opposite the Heiligenberg, the hills covered with vineyards, and its curious bridge, renders it attractive to the tourist. To travellers its greatest attraction is the ruined castle, which presents in its different portions every phase of architecture from the 14th to the 17th century. Having been restored in 1718-'20, it was set on fire by lightning in 1764, and it has never been rebuilt or tenanted since. In its vaults is the celebrated *Heidelberger Fass* (tun), once the largest in the world. The principal manufacture of Heidelberg is beer; its trade is confined

chiefly to linseed oil and tobacco.—Heidelberg was attached in 1362 to the Palatinate. Rupert I. enlarged it and made it an electoral residence. In 1384 the emperor Wenceslas signed here the union of Heidelberg, by which the different leagues of German cities were united in one. Heidelberg was plundered and partly ruined by Tilly in 1622, by Turenne in 1674, by Melac in 1688, and by Marshal de Lorges in 1693. These misfortunes led to its decline in political importance, which was finally completed by the residence of the electors being removed to Mannheim in 1719. It was united to Baden in 1802.

HEIDENHEIM, a town of Württemberg, 46 m. E. S. E. of Stuttgart; pop. in 1871, 5,167. It has manufactories of woollen and cotton goods, cloth, tobacco, yarn, and machines. An important trade is carried on in corn and cattle. The town is connected by railway with Aalen and the Stuttgart and Nördlingen railway. Ruins of the castle of the lords of Hellenstein, to whom Heidenheim and the neighboring country belonged till 1807, are still to be seen on the rock which overlooks the town.

HEIGHTS, Measurement of. See **BAROMETRICAL MEASUREMENT.**

HEILBRONN, a fortified town of Württemberg, on the right bank of the Neckar, 26 m. N. of Stuttgart, with which city it is connected by railway; pop. in 1871, 18,955. It has a gymnasium with a library of 12,000 volumes, and three Catholic and two Protestant churches, among which the church of St. Kilian is remarkable for the pure Gothic architecture of its choir and its beautiful tower, 220 ft. high. It stands on the site of a Roman station. In its vicinity is the castle in which Götz von Berlichingen was imprisoned in 1525. Heilbronn was a free imperial city until the beginning of the present century. In 1633 Oxenstiern here concluded a treaty with the allies of Sweden for the continuation of the thirty years' war.

HEILIGENSTADT, a town of Prussia, in the province of Saxony, 47 m. N. W. of Erfurt, on the Leine; pop. in 1871, 4,882. The town is regularly built, and surrounded by walls, with three gates. It has a castle, a Protestant and two Catholic churches, a gymnasium, formerly a Jesuit college, a workhouse, a hospital, and an orphan asylum. The principal manufactures are of woollen yarns and wooden clocks; it has a considerable trade in cattle. In the neighborhood is the famous Calvarienberg. Heiligenstadt is said to have been built by Dagobert around the tomb of Bishop Aureus of Mentz, who was slain by the Thuringians; it was anciently the capital of the principality of Eichsfeld. It was destroyed by fire in 1833, and was captured in 1478 by Count Henry the younger of Schwarzburg, and in 1525 by Duke Henry of Brunswick. From 1807 to 1813 it belonged to the kingdom of Westphalia.

HEIM, François Joseph, a French painter, born in Belfort, Dec. 16, 1787, died in Paris, Oct. 2,

1865. He decorated the ceiling of the gallery of Charles X. in the Louvre with a representation of Vesuvius receiving from Jupiter the fire which was to destroy Pompeii and Herculaneum. His allegory of the *renaissance* of the arts, on the ceiling of the French gallery in the same building, was much admired.

HEINE, Heinrich, a German poet and critic, of Jewish parentage, born in Düsseldorf, Dec. 12, 1799, or as Steinmann asserts in 1797, died in Paris, Feb. 17, 1856. His first poem was written on Napoleon's visit to Düsseldorf (Nov. 2, 1810). At the lyceum of Düsseldorf he made great progress in the regular studies, mastering also English, French, and Italian. In 1815 he was sent to Frankfurt to qualify himself for mercantile life, but showed such repugnance to it that in 1819 he was sent to Bonn to study law, but studied everything except law. In September, 1820, he went to Göttingen, which he learned to dislike and satirized bitterly in after years. He next removed to Berlin, where his character and feelings rapidly assumed that satirical indifference and reckless audacity now identified with his name. While in Berlin he earnestly studied philosophy under Hegel, and became intimate with Chamisso, Fouqué, Bopp, and Grabbe. Here in 1822 appeared his *Gedichte*, subsequently published as "Youthful Sorrows" in his "Book of Songs." Though favorably received by eminent critics, they attracted at the time but little attention. A single sorrow, the early disappointment of Heine in his love for his cousin Evelina van Geldern, runs through all these poems. He also published at this period his plays *Almansor* and *Radcliff*, with the *Lyrisches Intermezzo*. In the summer of 1822 he made a journey to Poland. He returned to Göttingen in 1823, was made doctor of law in 1825, and in the same year went to Heiligenstadt, where on June 28 he is said to have been baptized into the Lutheran church. Heine had taken his legal degree because his uncle, the eminent Hamburg banker and philanthropist Salomon Heine, had made it a condition of giving him his education. He however continued to aid him in his chosen literary career. He now went to Hamburg, where in 1826 he published the *Harzreise*, the first part of his *Reisebilder*. Very few books ever excited in Germany such an extraordinary sensation. In 1827 he went to Munich to edit with Dr. Lindner the *Politische Annalen*. In 1829 he returned to Berlin, and here occurred the famous quarrel with the poet Platen, who, having satirized Heine, received in return the most bitter sarcasm and withering abuse. Literature hardly affords any parallel to this cynical retort. In 1831 Heine went to Paris, having become so obnoxious to the Prussian government as a liberal writer that he had to choose between exile and imprisonment. From this time till 1848 his influence in Germany was very great, and he acquired in France the reputation of being the wittiest French writer

since Voltaire. In 1831 he wrote a series of articles on the state of France for the Augsburg *Allgemeine Zeitung*, which were collected and published both in French and German. In 1833 appeared his *Beiträge zur Geschichte der neuern schönen Literatur in Deutschland* (2 vols., Hamburg), and *L'Allemagne*, a characteristic and daring work, in which he attacked with relentless severity the romantic writers, the philosophers, and in fact nearly everybody. This book created a storm of fury in Germany, where democrats, pietists, Teutomaniahs, and state officials united in denouncing it; while in France no other work has done so much to stop the current of romanticism. In 1840 he published a violent work on his former friend Börne, then dead. This involved him in a duel with the husband of a lady who was stigmatized in the book as having entertained illicit relations with Börne. In 1843 he paid his last visit to Germany to see his mother. His public bitterness and literary cruelties were in strange contrast with his personal good qualities. He was generous, even self-sacrificing, especially to poor literary men, and during the cholera risked his life by remaining to nurse a sick cousin. In 1847 he was attacked by a painful spinal complaint, which tormented him almost without cessation until his death. By his own request all religious rites were omitted at his funeral. The bold infidelity, the reckless licentiousness, and the unqualified faith in the world and the flesh, which characterized Heine's life as well as his writings, were counterbalanced by such sincere belief in his own doctrines, such sympathy for suffering, and such acute perception of the beautiful in every form, that it is difficult for those unfamiliar with the social developments of modern continental European life and literature to appreciate his true nature or position. He received from the French government an annual pension of 4,000 francs from 1836 to 1848, but did not criticise it the less severely in his writings. In his later years Heine returned from unbounded skepticism, if not to an evangelical faith, at least to theism, the Bible being constantly read by him, and appearing to him, as he said, like a suddenly discovered treasure. As he still retained his love of paradox and of mystification, the real degree of his conversion became the subject of no little controversy and comment. In the latter part of his life Heine married "Mathilde," of whom he often speaks tenderly in his writings. His works, in addition to those mentioned, are: *Französische Zustände* (Hamburg, 1833); *Der Salon* (1834-'40); *Shakspeare's Mädchen und Frauen* (Leipsic, 1839); *Neue Gedichte* (Hamburg, 1844); *Ballade über die Schlacht von Hastings* and *Atta Troll* (1847); *Romanzero* (1851); *Doctor Faust, ein Tanzpoem* (1851); *Vermischte Schriften* (1854); and *Les aveux d'un poète de la nouvelle Allemagne*, in the *Revue des Deux Mondes* (1854). A collection of his works was published in German at Philadelphia in 1856 (6 vols. 8vo; new ed., 7 vols. 12mo, 1865), and a complete edition at Ham-

burg in 1861-'7 (21 vols. 8vo). There is also a French version executed by Heine himself, under the revision of Gérard de Nerval and others, and several translations of special poems have appeared. The following works on Heine have appeared since his death: *Heinrich Heine, Erinnerungen*, by Alfred Meissner (Hamburg, 1856); *H. Heine's Wirken und Streben*, by Strodtmann (1857); *H. Heine's Denkwürdigkeiten aus meinem Leben mit ihm*, by Steinmann (1857); *Ueber H. Heine*, by Schmidt-Weissenfels (1857); *H. Heine's Leben und Werke*, by Strodtmann (1867-'8); *Heinrich Heine und seine Zeit*, by his niece, Helene Hirsch (published simultaneously in German and French, 1873); and "Life and Opinions of Heine," by William Stigant (2 vols., 1873). English versions of Heine's works are: the "Pictures of Travel," translated by Charles G. Leland (Philadelphia, 1856); the "Book of Songs," by J. E. Wallis (London, 1856), and by C. G. Leland (Philadelphia, 1864); the "Poems of Heine, complete, translated in the Original Metres," by Edgar Alfred Bowring (London, 1859); and "Scintillations from the Prose Works of Heinrich Heine," translated by S. A. Stern (New York, 1873).

HEINECCIUS, Johann Gottlieb, a German jurist, born in Eisenberg, Saxony, Sept. 11, 1681, died in Halle, Aug. 31, 1741. He was educated at Leipsic and at Halle, where he became professor of philosophy in 1713, and of law in 1721. He went to Franeker in 1723 and to Frankfort-on-the-Oder in 1727, but resumed his professorship at Halle in 1733. His works are very numerous and of great value to the legal student. A collective edition was published at Geneva under the title of *Opera ad Universam Jurisprudentiam, Philosophiam, et Literas Humaniores Pertinentia* (9 vols. 4to, 1769).

HEINECKEN, Christian Heinrich, a precocious child of Lübeck, born Feb. 6, 1721, died June 27, 1725. He could speak at the age of 10 months, recite the principal events of the Old Testament two months afterward, and had committed to memory the history of antiquity when little over two years old, besides speaking fluently Latin and French. At three years he was familiar with universal history and geography. From all sides people came to see him, and on the invitation of the king of Denmark he visited Copenhagen. His constitution was very delicate, and until four years old he was supported only by the milk of his nurse. His biography was written by his teacher, Christian von Schönerich.

HEINICKE, Samuel, a German educator, born at Nautschütz, near Weissenfels, April 10, 1729, died in Leipsic, April 30, 1790. At 21 years of age he joined the life guards of the elector of Saxony, in which he served four years, and taught himself Latin and French. He afterward engaged in teaching, studied for a time at Jena, became a private tutor in Hamburg, and in 1768 chorister in Eppendorf. He

had several years previously been successful in teaching deaf mutes, and now taught a deaf and dumb boy to speak. Large numbers of deaf mutes were consequently put under his care, and his reputation became so great that the elector of Saxony solicited him to return to his native country. He went to Leipsic, and on April 14, 1778, opened the first institution for the instruction of the deaf and dumb in Germany. He also took great interest in public education, and vigorously attacked the old system of learning by rote. After his death his wife continued to direct the institution. His principal writings are: *Beobachtungen über Stumme und die menschliche Sprache* (Hamburg, 1778); *Ueber die Denkart der Taubstummen* (Leipsic, 1780); *Ueber alte und neue Lehrarten* (1783); and *Wichtige Entdeckungen und Beiträge zur Seelenlehre und zur menschlichen Sprache* (1784).

HEINSE, Johann Jakob Wilhelm, a German author, born at Langewiesen, Schwarzburg-Sondershausen, about 1749, died in Beutz, July 22, 1803. His first publication was a very free translation of Petronius Arbiter, followed by *Laidion*, an apotheosis of the voluptuous and beautiful in art. Heinse defended himself against the charge of indecency, while Goethe, impressed by the extraordinary merit of *Laidion*, apart from its immorality, praised it highly. In 1776 he left Gleim to accompany Jacobi to Düsseldorf, whom he there assisted in editing a periodical entitled *Iris*. In 1780 he went to Italy, proceeded in 1782 with the artist Kobel to Naples, and returned with Angelica Kauffmann to Rome. Having returned to Germany, principally on foot, he became librarian to the elector of Mentz, and published the famous romance of *Ardinghello*. This was succeeded by *Anastasia*, a romance consisting of problems in chess and scenes turning on the game; and this by *Hildegard von Hohenthal*, the conclusion of *Ardinghello*. In addition to the above, he wrote *Sinngedichte* (Halberstadt, 1771), and translated Ariosto's "Orlando" and Tasso's "Jerusalem Delivered."

HEINSIUS, Antonius, grand pensionary of Holland, born in 1641, died at the Hague, Aug. 13, 1720. He was an intimate friend and confidential agent of Prince William III. of Orange, and during 40 years was the moving spirit of Dutch politics. After William became king of England (1689), Heinsius managed for him, greatly to his satisfaction, the affairs of Holland, and was instrumental in rendering the states general favorable to friendly action with England. The grand alliance on the subject of the Spanish succession, between the emperor, the kings of England, Prussia, and Denmark, Holland, the duke of Savoy, and the elector of Hanover, against Louis XIV. and Philip V., was in great measure due to the exertions of the grand pensionary. The defeats of Blenheim (1704), Ramillies (1706), and Turin (1706), with their results, compelled Louis XIV. to open negotiations. He made overtures to Hol-

land; but Heinsius answered that the Hollanders were inseparably bound to their allies, and exacted as a preliminary condition the recognition of the right of the house of Austria to the Spanish succession. To this France refused to accede; the war was continued disastrously for her, and in 1709 her renewed application met with the same response. Louis XIV. now consented to treat on this basis, and negotiations were commenced; but the allies demanding still greater sacrifices, he renewed the war, and after the defeat of Malplaquet (1709) conferences were again opened at the castle of Gertruidenberg and continued unsuccessfully for four months, Heinsius obstinately adhering to his terms. France, everywhere beaten, was in great danger when, in 1711, Queen Anne of England secretly offered peace to Louis XIV. The congress of Utrecht, opened in January, 1712, resulted in England's ceasing hostilities; but Prince Eugene, the Hanoverians, and the Dutch persevered in the war, and took Le Quesnoy, July 4. The defeat of the allies at Denain (July 24) changed the whole state of the war. In a few days several important places were recaptured by the French, and armistices were separately concluded with England and Portugal. Notwithstanding these reverses, Heinsius did all in his power to prevent a general peace. In spite of his efforts, one was agreed upon and signed at Utrecht, April 11, 1713, but the signature of Heinsius was the last affixed. He died seven years later, while vigorous in mind and body.

HEINSIUS, I. Daniel, a Dutch philologist, born in Ghent, June 9, 1580, died in Leyden, Feb. 25, 1655. He was educated at the university of Leyden, where in his 25th year he succeeded Joseph Scaliger as professor of politics and history. In 1618 he acted as secretary to the synod of Dort. He edited the principal Greek and Latin classics, and wrote two Latin tragedies entitled *Auriacus* and *Herodes Infanticida*; *Exercitationes Sacre ad N. T. Libros* (Leyden, 1639, and Cambridge, 1640); a poem in four books styled *De Contemptu Mortis*; and various other valuable works. **II. Nicolaas**, a Dutch poet, son of the preceding, born in Leyden, July 29, 1620, died at the Hague, Oct. 7, 1681. He was educated at the university of his native city. In 1649 he went to Sweden at the invitation of Queen Christina, and settled at Stockholm, where he remained till his father's death in 1655. His latter days were unhappy, and passed for the most part in his native land. He was the author of Latin poems, the graceful style of which gained for him the appellation "swan of Holland."

HEIR (Lat. *hæres*), in law, one entitled by descent and right of blood to lands, tenements, or other hereditaments. There are two ways in law in which the title to real estate may pass, by purchase and by descent. It is said to be by purchase when it is transferred by the owner by any species of gift, grant, or conveyance, to take effect either in his lifetime or by

way of testamentary disposition; and it is by descent when, by reason of his dying intestate, it passes to such relative or relatives as by law are designated to succeed to his real property in that contingency. The word heir is sometimes used in a popular sense as signifying any one to whom property of any description is to pass on the death of its owner, whether by conveyance or by operation of law; and when it is thus employed in wills or other instruments, the law seeks to give effect to the instrument according to the real intent of the party, though the word is misapplied. In a legal sense no one is heir to personal property, and though the law in this country usually gives the real and personal property of an intestate to the same persons, the latter goes first to the administrator, through whom it is distributed after the debts are paid. In the Roman civil law, the word *hæres*, which we translate heir, meant any one called to the succession, by blood, devise, or bequest, and whether the property to which he succeeded was fixed or movable.—An heir apparent is one who must be the heir if he survive the owner, as the eldest son in England, or all the children in the United States. But the phrase “heir apparent” is not strictly applicable here. In England, the birth of a younger son cannot affect the rights of inheritance of the eldest son, for they are fixed, and he alone can be heir by descent. But in this country the younger son has an equal right with an elder son; and therefore the exclusive right of inheritance can never be fixed in any children living.—An heir presumptive is one who, if things do not change, will be the heir at the death of the owner, as the elder son of a deceased brother in England, or all the children of a brother in the United States, where the owner has no children; for they will be heirs if he dies without issue. As an heir presumptive may lose his heirship by a change of circumstances, he does not become an heir apparent so long as this change is legally probable, although physically or naturally impossible.

HELDER, *The*, a fortified seaport town of Holland, at the N. extremity of the province of North Holland, 40 m. N. W. of Amsterdam; pop. in 1871, 17,296. From an obscure fishing village Napoleon I. converted this place into a fortress of the first rank, capable of containing a garrison of 10,000 men. Its batteries command at once the entrance to the Zuyder Zee and that of the harbor of the ship canal at Nieuwe Diep. It is connected with Amsterdam by a canal 50 m. long, 125 ft. broad, and 21 ft. deep. The port and coasts are protected from the aggressions of the ocean by dikes, one of which is 6 m. long and 40 ft. broad, and has an excellent road on its summit.

HELEN (Gr. Ἑλένη; Lat. *Helena*), in Greek legends, the wife of Menelaus, and the most beautiful woman of her time. Her parentage is variously assigned to Jupiter and Leda, the wife of King Tyndareus, to Jupiter and Nemesis, and to Tyndareus and Leda. Before Hel-

en was 10 years of age she was carried off by Theseus, who concealed her at Aphidnae, under the care of his mother Æthra. Her brothers Castor and Pollux released her, and carried her back to Sparta with Æthra as her slave. She now had suitors from all parts of Greece, among whom was Ulysses. By the advice of this hero Tyndareus left the choice to Helen, and she accepted Menelaus, to whom she bore Hermione, and according to some Nicostratus also. Three years after this marriage she was seduced by Paris, the son of Priam, and fled with him to Troy. The Grecian princes, in accordance with an oath which they had taken when suitors together at the court of Tyndareus, took up arms to restore to Menelaus his wife, and the Trojan war was the consequence. Paris was killed during the siege, and Helen then married Deiphobus, another son of Priam; but when the city was taken, she treacherously introduced the Greeks into his chamber in order to appease Menelaus. She returned to Sparta, and received her first husband's forgiveness. The accounts of her death differ. According to one, after the death of Menelaus, she was driven into exile by Nicostratus and Megapenthes, and retired to Rhodes, where the queen of that island, Polyxo, whose husband Tlepolemus had been killed in the Trojan war, caused her to be seized while bathing, tied to a tree, and strangled. The Rhodians commemorated the murder by a temple raised to *Helena Dendritis*, or Helen tied to a tree. The Spartans honored her as a goddess, and built a temple to her at Therapne, which had the power of conferring beauty upon all ugly women who entered it.

HELENA, a town and the capital of Phillips co., Arkansas, on the right bank of the Mississippi river, about 100 m. E. by S. of Little Rock, and 80 m. below Memphis, Tenn.; pop. in 1870, 2,249, of whom 1,109 were colored. It is the terminus of the Arkansas Central, the Helena and Iron Mountain, and the Mobile and Northwestern railroads, is rapidly improving, and is an important commercial point. It contains a court house, a jail, two daily and three weekly newspapers, four schools, and seven churches.—In the summer of 1863 Helena was held by a Union force of about 4,000, commanded by Gen. Prentiss, strongly intrenched, the river also being commanded by a gunboat. On July 4 an unsuccessful attempt to seize the place was made by a confederate force of about 7,600, under Gen. Holmes. The confederate loss in the engagement was officially reported as 173 killed, 687 wounded, and 776 missing, in all 1,636; but Gen. Prentiss reported that he had buried 300 confederate dead and made 1,100 prisoners. The entire loss of the Union force did not exceed 250 in killed and wounded, with no prisoners.

HELENA, a town and the capital of Lewis and Clarke co., Montana, on the W. side of the valley of Prickly Pear and Ten Mile creeks, at the foot of the Rocky mountains, 15 m. W. of the

Missouri river, and 110 m. N. of Virginia City; lat. $46^{\circ} 35' 36''$ N., lon. $111^{\circ} 52' 45''$ W.; pop. in 1870, 3,106, of whom 641 were Chinese. It is the largest town of the territory, and is connected by stage with Virginia City and Corinne, Utah, on the Central Pacific railroad, 445 m. S. It is chiefly supported by the rich quartz and placer gold mines in the vicinity. The neighboring mountains are covered with forests of pine and fir, which supply several saw mills. The streams and mountain springs furnish abundant water. About 4 m. N. W. of the town are medicinal hot springs. A large portion of the buildings are constructed of brick, granite, and blue limestone, obtained in the vicinity. The town contains a court house, jail, almshouse, masonic hall, and the offices of the United States surveyor general, register and receiver of lands, collector of customs, and marshal. There are 3 cabinet factories, 2 carriage factories, 1 foundery, 3 assay offices, 4 breweries, 1 distillery, 5 bakeries, 4 hotels, 2 national banks with a capital of \$200,000, about 60 stores, 4 schools, 2 daily and weekly newspapers, 6 religious societies, and 3 churches. Helena was settled in 1864. It has been visited by several conflagrations, the last and most destructive of which occurred Jan. 9, 1874.

HELENA, Saint, an island. See SAINT HELENA.

HELENA, Saint, wife of the emperor Constantius Chlorus and mother of Constantine the Great, born in Drepanum (Helenopolis), Bithynia, in 247, died in Nicomedia about 327. She was probably of obscure parentage, though some historians pretend that she was a British princess. When her husband was made Cæsar

in 292, he put her away and espoused Theodora, stepdaughter of the emperor Maximian; but in his will he acknowledged Constantine, his son by Helena, as his sole heir. Constantine on assuming the purple (306) brought his mother to reside in the imperial palace at Treves, loaded her with honors, gave her the title of Augusta, and conferred her name upon several cities of the empire. She erected and endowed a number of churches, and at the age of 79 made a pilgrimage to Jerusalem, where, according to the earliest Byzantine historians, she discovered the true cross. (See CROSS.) She died in the arms of her son, and her body was carried to Rome, where a mausoleum was raised to her.

HELIANTHUS. See SUNFLOWER.

HELICON, a mountain range of Greece, in Bœotia, between Lake Copais and the Corinthian gulf. Its loftiest summit, now called Paleo-Vuno, is 5,738 ft. high. In antiquity the slopes and valleys of Helicon were renowned for their fertility, and it was considered the favorite abode of the muses. Above Asera was a grove sacred to them, and near it the famous fountain of Aganippe, which was believed to inspire those who drank of it. About two miles higher up was the fountain of Hippocrene, produced, according to the legends, by Pegasus's striking the ground with his hoofs.

HELIGOLAND, or *Helgoland* (holy land), an island in the North sea, belonging to Great Britain, 40 m. N. W. of the mouth of the Elbe; lat. of its lighthouse, $54^{\circ} 11' 36''$ N., lon. $7^{\circ} 53' 12''$ E.; pop. in 1871, 1,912. Heligoland is triangular, about a mile long from N. to S. and



Heligoland.

$\frac{1}{2}$ m. broad from E. to W. It was formerly much broader, but the action of the sea is continually wearing it away. There is a good port on the N. side, and another on the S. About the middle of the last century a portion was separated from the main island, and is now known as Sandy island; this is much resorted to for its fine sea bathing. The highest part of the island, its W. side, is 200 ft. above the sea. Heligoland is supposed to have been the island mentioned by Tacitus, where the German goddess Hertha was worshipped. St.

Wilbrord preached Christianity there early in the 8th century, and gave it its present name. In 1714 it was taken from the duke of Holstein-Gottorp by the Danes, from whom it was captured by the English in 1807, for whose fleets it served as a station during the war with France, and as a depot for their manufactures, whence they were smuggled into Germany. It was formally ceded to Great Britain in 1814. The inhabitants are descendants of Frisians, and speak the Frisian language as well as the Low German. The men are mostly fisher-

men and pilots, and leave nearly all domestic and agricultural labor to the women. The trading part of the population are chiefly emigrants from the mainland of Germany. The chief products are haddocks and excellent lobsters, which are exported to Germany. The islanders own 100 small fishing vessels and several larger ones, which make voyages to England and the Baltic ports. The soil is very rich, and grain and vegetables are raised, though most of the land is devoted to the sustenance of flocks of sheep, which are fed on fish in winter. There are a few trees and two or three springs on the island, but most of the people depend on rain for their supply of water. Of late the inhabitants have begun to turn their attention to building houses for rent to summer visitors, with whom it is a favorite bathing place. The government consists of a governor appointed by the crown, aided by an executive council; a form of government established by the queen in 1868.—See “Heligoland, an Historical and Geographical Description of that Island, its Ancient Fortunes and Present Opportunities as a British Colony,” by William Bell (London, 1856).

HELIODORUS, a Greek romance writer, born in Emesa, Syria, flourished at the close of the 4th century A. D. In his latter days he became a Christian, and bishop of Tricca in Thessaly, where he introduced the regulation that every priest should be deposed who did not repudiate his wife. His *Æthiopia*, written in early life, treats of the loves and adventures of Theagenes and Chariclea. Its style is simple and elegant. Translations of it now exist in all the European languages, but before the 16th century its very existence was unknown to Europe. The best edition of the Greek text is that of Paris, 2 vols. 8vo, 1804.

HELIOGABALUS. See ELAGABALUS.

HELIONETER (Gr. *ἥλιος*, the sun, and *μέτρον*, measure), an instrument to measure the diameter of the sun, or other small arc in the heavens. Several instruments receive this name, but it is now usually applied to a telescope whose object glass is divided into two parts, capable of sliding by each other, so that they may be directed to opposite edges of the sun. Two images of it are thus formed, tangent to each other, and the displacement of the parts of the object glass measures the diameter of the sun.

HELIOPOLIS (Gr., city of the sun; called in old Egyptian *On* or *An* and *Ha-Ra*, in Hebrew *Bethshemesh*, and by the modern inhabitants *Matariyeh*), one of the most ancient cities of Egypt, below the S. E. point of the delta, on the E. side of the Pelusiac arm of the Nile, near the canal which connected that river with the Red sea, about 8 m. N. E. of the site of modern Cairo. From the remotest epoch it was renowned for its temples and priesthood. It was the chief seat of the Egyptian worship of the sun, and also of the sacred bull Mnevis; and the legends of the wonderful bird phoenix centred about it. Its priests were the most

learned in the land, and so important that they sent one third of all the deputies to the great council which assisted the Pharaohs in the administration of justice. Those belonging to each temple were organized among themselves with great exactness, and the office of the high priest, who was one of the first persons of the state, was hereditary. The Hebrew Joseph married Asenath, the daughter of one of these high priests. To the Heliopolite priests resorted foreigners who wished to learn the wisdom of the Egyptians. Solon, Thales, Eudoxus, and Plato all studied under them; and when Strabo visited the place (24 B. C.) he was shown the halls which Plato was said to have occupied for 13 years. After being for ages a sort of university city, Heliopolis had much declined as early as the invasion of Cambyzes (525 B. C.), and was a city of ruins when visited by Strabo. Abdallatif, an Arab physician of the 12th century, described among its ruins colossal figures in stone, standing or sitting, and more than 30 cubits high. An obelisk of red granite, inscribed with the name of Osortasen I., whose date is fixed at about 3000 B. C., still remains, and is regarded as the most ancient known specimen of Egyptian sculpture; there are also some fragments of sphinxes and of a colossal statue which adorned the ancient temple of the sun. Near the hamlet of Matariyeh, which occupies a part of the site of Heliopolis, Kléber gained a victory over Turkish troops, March 20, 1800. (For Heliopolis in Syria, see BAALBEK.)

HELIOS (the Sol of the Romans), in Greek mythology, the god of the sun, the son of Hyperion and Thea, and the brother of Selene (Luna) and Eos (Aurora). Helios gave light both to gods and to men. He rose in the east from Oceanus, ascended to the highest point in the heavens, and then descending arrived in the evening at the west, and returned to Oceanus. He had two magnificent palaces, one in the east, the other in the west, where he sat enthroned surrounded by ministering Horæ. The horses that drew the chariot in which he made his daily journey were pastured in the islands of the blessed, and the golden boat in which he voyaged nightly from the west to the east was the work of Hephestus (Vulcan). Helios saw everything. The island of Sicily was sacred to him, and he there had flocks of sheep and herds of oxen, which never increased or diminished in number, and which were tended by his daughters, Phætusa and Lampetia. In later times Helios was frequently confounded with Apollo, though originally they were quite distinct. Among the Greeks this identification was never fully carried out; for no Hellenic poet ever made Apollo to ride in the chariot of Helios, and the representation of Apollo with rays around his head belongs to the time of the Roman empire. Temples of Helios existed in Greece at a very early period, and subsequently his worship was established in Corinth, Argos, the island of Rhodes, and vari-

ous other places. The sacrifices offered to him were rams, boars, bulls, goats, lambs, white horses, and honey. Among the animals sacred to him the cock was preëminent. Helios was usually represented as riding in a chariot drawn by four horses.

HELIOSCOPE. See TELESCOPE.

HELIOSTAT, and **Heliotrope**, instruments used by surveyors for rendering distant stations visible. The heliostat was invented by 's Gravesande about 150 years ago, and consists of a mirror turned by clockwork in the pathway of the sun, in such a manner that it will reflect his rays in a certain direction. A mirror of only one inch diameter can be seen eight miles, and appears as a brilliant star at a distance of two miles. The heliotrope is simply a mirror fixed permanently at a station so as to throw its rays to another station, or always in one direction. This requires of course that an observation should be taken at a certain moment, as the direction of the reflected beam is constantly changing. For most observations the latter instrument answers all the purposes of the former, and is much less expensive.

HELIOTROPE (*heliotropium*, Linn.), the name of annual or perennial plants belonging to the natural order *boraginaceæ*. *H. curassavicum* is a smooth annual found in Virginia, Illinois, and southward. *H. Europæum* occurs sparingly in the southern states as an introduced weed. The species in cultivation are *H. Peruvianum* and *H. corymbosum*; these have woody stems, oblong hairy leaves of a pale green color, and terminal, branching flower stalks. The pleasantly fragrant flowers are small, but they grow compactly in the recurved spikes. The corolla



Heliotrope.

is intersected at its mouth with five folds, and is of a purple-lilac color, with a greenish white throat. The principal difference between the two species is that the last named has larger, darker colored, and less strongly scented flowers. Numerous seedling varieties

have been raised, chiefly distinguished by the tint of the corolla, a yellowish or pure white throat, or else by the greater size of the spikes or "trusses." Heliotropes are readily propagated from cuttings of tender shoots, and great numbers are raised annually by florists for sale as bedding plants; though it is a shrub, small plants from the unripe wood will flower freely. Plants for the greenhouse may be trained as standards or pyramids, or they may be trained to the wall of a greenhouse; thus treated they will grow 4 or 5 ft. high. The odor of the heliotrope is compared by some to that of vanilla; in England it is frequently called "cherry pie" on account of its fragrance. Pliny and Dioscorides assert that the flowers of the heliotrope turn toward the sun, whence its ancient and generic name. For the same reason it has also been called turnsole and girasole.—False heliotrope (*Tournefortia heliotropioides*) is a garden annual, with flowers closely resembling those of the heliotrope in everything except odor; the plant when bruised is disagreeably scented; in some southern gardens where it has been raised for ornament it has established itself as a weed. Indian heliotrope (*heliotropium Indicum*) is a coarse hairy annual with much the aspect of a heliotrope, which has been introduced from India, and is found in waste places in Illinois and southward.

HELIX (Gr. *ἑλῆξ*, a whorl or coil), in architecture, a spiral winding around a central axis, according to some authorities without approaching it, in which case it would be designated a spiral. The little volutes under the flowers of the Corinthian capital are also called helices.—In electro-magnetism, a helix is a coil of wire wound around any body which is to be magnetized by the passage of the electric current through the wire. The power is increased with the number of turns, the wire being insulated, so as to prevent lateral discharge, by winding cotton thread about it.

HELIX, in conchology. See SNAIL.

HELL, Maximilian, a Hungarian astronomer, born in Schemnitz, May 15, 1720, died in Vienna, April 14, 1792. At 18 years of age he entered the society of Jesus, and in 1745 was made assistant astronomer at the observatory in Vienna belonging to the order, and keeper of the museum of experimental philosophy. In 1751 he took holy orders. Subsequently he filled the chair of mathematics at Klausenburg in Transylvania for four years, and in 1756 was appointed astronomer and director of the new observatory in Vienna. In April, 1768, he undertook a journey to Vardöhuus in Lapland to observe the transit of Venus, June 3, 1769, in which he succeeded perfectly, and returned to Vienna in August, 1770. His chief work is a series of *Ephemerides*, commenced with *Ephemerides Anni 1757 ad Meridianum Vindobonensem Calculis definitis*, continued to the year 1791 (35 vols. 8vo, Vienna).

HELLAS. See GREECE.

HELLE, in Greek legends, a daughter of Athamas, king of Thebes, by the goddess Nephele. When her brother Phrixus was about to be sacrificed, the mother rescued him, and placing the two children on the back of the ram with the golden fleece, which she had received from Mercury, fled with them to Asia; but between Sigæum and the Chersonesus Helle fell into the sea, and thenceforward that part of it was called Hellespontus, the sea of Helle.

HELLEBORE, in pharmacy, the roots of the various species of the genus *helleborus*, of the natural order *ranunculaceæ*, and of the *veratrum album* and *V. viride*, natural order *melanthaceæ*, now considered a suborder of *liliaceæ*.



Black Hellebore (*Helleborus niger*).

The black hellebore, *helleborus niger*, is a plant growing wild in the mountainous parts of southern and central Europe, and cultivated in gardens for the sake of its beautiful rose-like flowers, which bloom in midwinter and give to the plant the name of the Christmas rose. In the United States its time of blooming is very early in spring. The fibres of the roots are used for preparing the extract, decoction, or tincture. They are exceedingly acrid and burning to the taste, and when fresh produce inflammation and even vesication on being applied to the skin. They are irritant to all mucous membranes with which they may be brought in contact. The extract is a drastic purgative and emetic, but it is now seldom prescribed, except as an emmenagogue. Gradual paralysis and convulsions are among its poisonous effects upon the human system. Until the discovery of the *H. orientalis* it was supposed to be the same that furnished the black hellebore or *melampodium*, a famous medicine with the ancient Greeks and Romans, who used it in the belief that it gave clearness and activity to the mental faculties; and the most celebrated philosophers are said to have drunk its infusion for this purpose. It was also employed in mania, dropsy, and va-

rious other affections.—*H. fœtidus*, or bear's foot, is a perennial European plant of extremely acrid properties, a powerful emetic and cathartic, and long used in Great Britain as a domestic remedy for worms. It has even been known to cause the expulsion of the tapeworm. —White hellebore is the rhizoma of *veratrum album*, an herbaceous plant indigenous to the Alps and Pyrenees, and imported from Germany. Its virtue resides in the alkaloid veratria, which however is usually obtained from the seeds of *veratrum sabadilla*, growing in Mexico. This alkaloid, which has the formula $C_{24}H_{52}N_2O_{16}$, is a powerful irritant when applied externally, and when absorbed diminishes the activity of the heart and the irritability of the nerves and muscles. It is also emetic and cathartic. It is seldom used in medicine except as an external application, in the form of an ointment, in gout, rheumatism, and neuralgia. It has of late become an important horticultural appliance, as it is found to be the most effective destroyer of the currant worm, *abraxas ribearia*, which in some localities defoliates the plants and destroys the crop of fruit. The powdered white hellebore is sifted upon the leaves, or stirred with water and applied



White Hellebore (*Veratrum album*).

with a syringe.—American hellebore is the rhizoma of *V. viride*, or Indian poke, a common plant in the swamps and meadows of the northern and middle states. It resembles the European species in its violent action as an emetic, and also in stimulating the secretions. It acts powerfully upon the nervous system, producing vertigo and dimness of vision, and dilating the pupils. The frequency and force of the pulse are diminished under its influence. By careful management it may be used for reducing the pulse in inflammatory diseases without the unpleasant effects just mentioned. Its action is supposed to depend upon two alkaloids, veratroidia, very similar to if not identical with

veratria and viridia, which produces the sedative effect upon the circulation just mentioned, and very little if any emetic or cathartic action. The fluid extract and tincture of *V. viride* have been largely employed, in doses of one, two, or three drops frequently repeated, in diseases attended with fever. It is doubtful, however, whether the curative effect over the disease corresponds to the lowering of the pulse. Pneumonia, peritonitis, and cardiac diseases are the affections in which it has been most employed.

HELLEN. See GREECE, vol. viii., p. 187.

HELLER, Joseph, a German author, born in Bamberg, Sept. 22, 1798, died there, June 4, 1849. He left mercantile pursuits for the study of art, made extensive collections, and wrote biographies of Lucas Cranach, Albrecht Dürer, and other artists. Among his other works are *Geschichte der Holzschnidekunst* (Bamberg, 1822), and *Handbuch für Kupferstichsammlung* (3 vols., 1823-'36).

HELLER, Karl Bartholomäus, a German naturalist, born in Moravia in 1824. In 1845 he made collections of natural history in Mexico and Central America for the horticultural society of Vienna, and on his home journey in 1848 he visited Cuba and the United States. In 1851 he became adjunct and in 1853 titular professor of natural history at the university of Gratz. His publications include *Beiträge zur näheren Kenntniss Mittelamerikas* (Gratz, 1853), *Reisen in Mexico* (Leipsic, 1853), and *Das dioptrische Mikroskop* (Vienna, 1856).

HELLER, Stephan, a German composer, born in Pesth, Hungary, May 15, 1814. At the age of nine he played in public with his teacher Dussek's concerto for two pianos. He went soon after to Vienna, and received lessons from Czerny and Häfl. In 1827 and 1828 he gave concerts in Vienna, and in 1829 went on a concert tour through Hungary and Germany. At the age of 16 he took up his residence at Augsburg, remaining there until he went to Paris in 1838, where he has since for the most part resided. His compositions are almost exclusively for the pianoforte, and are distinguished by originality of thought and treatment, elevation of style, and poetic refinement. Fétis ranks him as a composer for the pianoforte above Chopin. While this praise may be exaggerated, it is nevertheless true that Heller is one of the most poetic and captivating writers for that instrument. His published works number about 150, including many admirable arrangements for piano of the songs of Schubert, Mendelssohn, and other composers, and such original series as the *Nuits blanches* and the *Wanderstunden*.

HELLESPONT (Gr. Ἑλλησποντος, sea of Helle), in ancient geography, the narrow strait (now the Dardanelles) connecting the Ægean sea with the Propontis (sea of Marmora), and separating the Thracian Chersonesus (peninsula of Gallipoli) from Asia Minor.

HELL GATE. See BLASTING, vol. ii., p. 702.

HELLIN, a town of Murcia, Spain, in the province and 35 m. S. by E. of the city of Albacete, situated on the slope of the Segura mountain chain, near the E. bank of the Mundo; pop. about 10,000. It contains a large square and a number of smaller ones, a fine old parish church, and remains of a Roman castle. Trade is carried on in various goods manufactured here, in grain, wine, and silk, but chiefly in sulphur, from celebrated mines about 13 m. distant, which belong to the government, and were known to the Romans. Near the town is the hermitage of San Rosario, and at a distance of about 6 m. the springs of Azaraque.

HELM. See STEERING APPARATUS.

HELMERS, Jan Frederik, a Dutch poet, born in Amsterdam in 1767, died Feb. 26, 1813. His principal work is his national poem *De Hollandsche natie* ("The Dutch Nation") (Amsterdam, 1812, and many later editions), which has been translated into French by Anguste Clavereau. He published a collection of his poems (2 vols., Amsterdam, 1809-'10), and his posthumous writings appeared in Haarlem in 1814-'15.

HELMET SHELL (*cassis*), a genus of gastropod mollusks, separated by Lamarck from the Linnean genus *buccinum*. About 40 species



Helmet Shell.

are described, living in shallow tropical seas in the East and West Indies, on the east coast of Africa, in the Pacific, and in the Mediterranean; nearly as many fossil species have been found in the eocene of Chili and France. The shell is ventricose, with irregular rows of protuberances on the whorls; spire short; aperture long, with the outer lip reflected and toothed, and the inner lip spread over the body whorl. The species are of considerable size, and many are used for the manufacture of cameos, the different colors of the layers of the shells rendering them well adapted for this purpose. In the *C. cornuta* the cameo would be white on an orange ground; in *C. tuberosa* and *Madagascariensis* (the queen conch of Madagascar), white on a dark claret color; in *C. rufa*, pale salmon color on orange. (See CAMEO.)

HELMHOLTZ, Hermann Ludwig Ferdinand, a German physicist and physiologist, born in Potsdam, Aug. 31, 1821. At the age of 17 he was admitted to the royal military school in Berlin, and commenced the study of medicine. In 1842, in his graduating thesis entitled *De Fabrica Systematis Nervosi Everttebratum*, he endeavored to prove the existence of an anatomical connection between the nerves of motion and those of sensation through the intermediate means of ganglion cells, and presented the results of numerous examinations of the delicate nerve fibres of bugs, spiders, crabs, and many lower animals. Until 1843 he was assistant physician at the Charité hospital, and then be-

came military surgeon stationed at Potsdam. During the five years following he practised medicine, contributed a great number of articles on mathematical and physical science to various periodicals, and laid the foundation for his scientific reputation by a finished work "On the Conservation of Force" (Berlin, 1847). He was at once recognized as one of the chief investigators and promoters of the new philosophy of force. A popular lecture on the same subject, delivered some years later in Königsberg, was translated by Prof. Tyndall of London for the "Philosophical Magazine," and attracted a great deal of attention throughout the world. In 1843 he had written "On the Nature of Putrefaction and Fermentation" (Müller's *Archiv für Anatomie, Physiologie und wissenschaftliche Medizin*), proving putrefaction to occur independently of microscopical living beings, but modifiable thereby and then constituting fermentation; in 1845, "On Animal Heat," with especial consideration of the question whether the living animal body gives off as much heat as is produced by the combustion and change of the food it takes in (*Berliner encyclopädisches Wörterbuch der medicinischen Wissenschaften*); also, "On the Consumption of Tissue during Muscular Action" (Müller's *Archiv*, 1845); and "Proof of a Development of Heat during Muscular Action" (Müller's *Archiv*, 1848). He for the first time proved by actual experiments a difference of chemical composition in the active and in the quiescent muscle. In 1848 he returned to Berlin as prosector of anatomy and tutor in the art academy, and in 1849 became professor of physiology in the university of Königsberg. Soon afterward he began his celebrated investigations as to the rapidity of propagation of nerve excitation. The first report of them appeared in the *Berichte über die Verhandlungen der Königlich-Preussischen Akademie der Wissenschaften zu Berlin* under date of Jan. 21, 1850; and he published two elaborate articles in Müller's *Archiv* for 1850 and 1852. By means of ingenious methods for ascertaining exceedingly small differences of time, he demonstrated that thought is not instantaneous, that when we touch anything with the hand it takes a definite period to become conscious of the fact, and that when we determine to make a movement a certain measurable time elapses between willing the movement and executing it; he succeeded in accurately measuring these small fractional portions of a second. He was also the first who gave the correct explanation of the fact that on looking at a person's eye the pupil appears black, and why we cannot under ordinary circumstances see into the interior of the eye; and in 1851 he invented the ophthalmoscope, an instrument by means of which the retina of the living eye can be inspected, and which has completely revolutionized the knowledge of its condition in health and disease, and saved thousands of

persons from blindness. It is said that he was led to this invention by reflecting on the circumstance that while it is impossible during the daytime to see clearly into a room on the opposite side of a street, it can, however, be done at night, when the room is illuminated, and also during the day by throwing into it sunlight reflected by a mirror or a sun glass. His original invention is described in a separate work "On the Ophthalmoscope" (Berlin, 1851), an improvement in the *Archiv für physiologische Heilkunde* (1852), and the ophthalmometer in the *Archiv für Ophthalmologie* (1854). In 1855 Helmholtz became professor of anatomy and physiology in Bonn, in 1858 of physiology in Heidelberg, and since 1871 he has been professor of physics in Berlin. He is the author of two books, each of which forms an era in the branch of science to which it relates. The first, entitled *Handbuch der physiologischen Optik* (Leipsic, 1867), is in very many respects a pioneer labor. In addition to the anatomical description of the eye, it contains three divisions, "Dioptrics of the Eye," of which two sections were first published in 1856, "Doctrine of Visual Sensations" (1860), and "Doctrine of Visual Perceptions," finished in 1866. Helmholtz traces his subject from the remote past, establishes the so-called empirical theory of vision, and not only clearly points out the knowledge attained, but also shows the way in which further advance is to be made. The author's original researches in this work include every portion of the subject, from the investigation of the limits of human power of perception to that of the details of vision, and the analysis, combination, and appreciation of colors. His second important work is entitled *Die Lehre von den Tonempfindungen, als physiologische Grundlage für die Theorie der Musik* (Brunswick, 1862; 3d ed., 1870). In this he throws the light of natural science upon the inmost principles of music and æsthetics. In vain had philosophers and musicians for more than 2,000 years endeavored to explain musical harmony; the discovery of its cause, an achievement of the most recent times, is mainly due to Helmholtz. He invented the method of analyzing sound, thereby furnishing us a means of acquiring knowledge until then unthought of. The invention essentially consists in the use of hollow bodies, called resonators, the volume of air in which vibrates in the presence of a previously determined sound. Investigation by means of resonators may in the future lead to discoveries more important still than those hitherto attained; but it has already solved many puzzling questions of the past. Thus it had long been known that the note of many musical instruments is accompanied by its octave and the fifth of its octave; but by the employment of resonators it has been found that every sound, as it generally occurs in nature, and as it is produced by most of our musical instruments

or the human voice, is not a simple single sound, but a compound of several tones of different intensity and pitch, all of which different tones combined are heard as one. Helmholtz discovered that the difference of quality or *timbre* of the sounds of different musical instruments resides in the different composition of these sounds, *i. e.*, is due to the fact that different compound sounds may contain the same fundamental tone, but differently mixed with other tones. He also discovered the acoustic cause of the vowel sounds of human speech, and not only analyzed or decomposed them into their constituent elementary tones, but also imitated or rather artificially produced vowel sounds from elementary tones of tuning forks. Helmholtz has propounded a hypothesis of the manner of excitation of the acoustic nerve which in its physiological aspect has been generally accepted, although its anatomical basis is not yet sufficiently established. He has demonstrated that beats occasion dissonance, and that the perception of the relationship of two musical sounds is due to the sensation of one or more common simple sounds in them, and the perception of that of two chords to the sensation of one or more common compound sounds; shown how beats and foreign ingredients in sounds produce an intermittent excitation of certain fibres of the auditory nerve, and thereby become unpleasant; and suggested a reasonable explanation of the adaptability of music for emotional expression. A list, probably incomplete, of his contributions to various periodicals, published lectures, &c., enumerates more than 70 articles besides those already mentioned. Some of the more important are: "Course and Duration of certain Electric Currents," "Theorem on the Distribution of Electric Currents," "Analysis of Sunlight," "On the Theory of Composite Colors," "On the Accommodation of the Eye," "Comparison of the Luminousness of Different Colors," "Explanation of the Stereoscopic Phenomena of Lustre," "On Combination Tones," "On the Persistence of Visual Impressions," "On the Notes of Various Musical Instruments," "On the Normal Movements of the Human Eye," "Intermittent Movements of Liquids," "On the Friction of Liquids," "The Mechanism of the Ear Ossicles and Tympanic Membrane," "On a Theorem concerning geometrically similar Motions of Fluid Bodies, applied to the problem of guiding aerial balloons," and "On the Limits of the Power of the Microscope." Helmholtz's readiness and ability to present to the public at large in intelligible language the results of his researches, sometimes the most abstruse, have contributed largely to his fame. He has been delivering popular scientific lectures for more than 25 years. One on human vision was delivered in Königsberg in aid of Kant's monument (Leipsic, 1855), and in May, 1853, appeared one on Goethe's labors in natural science. This, together with three others, was

issued in book form (Brunswick, 1865; second series, 1871). All these have been translated by Prof. E. Atkinson, under the title of "Popular Lectures on Scientific Subjects," with an introduction by Prof. Tyndall (London and New York, 1873). The French academy admitted him to foreign membership in 1870, after a discussion during which a well known author said: "You will place yourselves in the worst light before the world if, for any reason, you refuse to admit Helmholtz, the foremost and greatest naturalist of the age;" adding, "Nothing is wanting to his glory, but he is wanting to ours."

HELMINTHS. See ENTOMOZA.

HELMONT, Jan Baptista van, a Flemish physician, born in Brussels in 1577, died near Vilvoorden, Dec. 30, 1644. He was educated at the university of Louvain with a view to the church, but refused to take orders, and spent several years in the universities of Italy and France, studying chemistry, natural philosophy, and medicine. On returning home he settled upon his estate near Vilvoorden. Dissatisfied with the works of Hippocrates, Galen, and Paracelsus, he attempted a reform in medicine. His system is mingled with considerable mysticism, but he did much to introduce exactness into science. He was the first to apply the term *gas* to the elastic fluids which resemble air in physical properties. His *gas sylvestre* was what is now known as carbonic acid, for, he says, it is evolved during the fermentation of wine and beer, and when charcoal is burned in the air, and also when carbonate of lime is dissolved in vinegar or nitric acid. To the combustible gases found in the intestines he gave the names *gas pingue*, *gas siccum*, and *gas fuliginosum*. He had no accurate knowledge of the gases which he produced or examined, but made the important discovery that air diminishes in bulk when bodies are burned in it. He believed that respiration consisted in the drawing of air into the pulmonary arteries and veins, which caused a fermentation necessary for its revivification. He believed with Paracelsus in the existence of an *archæus*, or spiritual essence or power which presided over digestion and fermentation. Water he considered capable of furnishing all the material of plants, and ultimately of fish and other animals, and also that it produced elementary earth or pure quartz, and the chemical principles salt, sulphur, and mercury. He excludes fire from the number of the elements because it is not a substance. The *archæus* has the power to draw all bodies from water where a ferment exists. This ferment preëxists in the seed which is developed by it. The ferment expels an odor which attracts the generating spirit of the *archæus*. This spirit consists of an *aura vitalis*, which forms matter after its own idea. In man the seat of the *archæus* is in the stomach, and it presides also over the spleen; and in consequence of its influence man is much nearer to

the realm of spirits than to the earth. As all diseases were in his opinion caused by the archæus, his treatment consisted in calming it, relying upon dietetics and the imagination of his patients. Mercurials, antimonials, opium, and wine he believed to be agreeable to the archæus. His preference for chemical remedies raised chemistry to a higher rank in the opinion of the medical men of his time. On account of the extraordinary cures that he was believed to have made, he is said to have been arrested as a sorcerer. The most important of his works is his *Ortus Medicinæ, id est Initia Physicæ inaudita, Progressus Medicinæ novus in Morborum ultionem ad Vitam longam*, which was published by his son four years after his death, and translated into Dutch, French, German, and English. A volume of translations of some of his works was published by W. Charlton in 1650, entitled "The Ternary of Paradoxes," "The Magnetic Cure of Wounds," "The Nativity of Tartar of Wine," and "The Image of God in Man."

HELMSTEDT, or *Helmstätt*, a town of Germany, in the duchy and 21 m. E. of the city of Brunswick; pop. in 1871, 7,469. It contains five squares, two churches, a town house, a gymnasium, several schools, and three hospitals. The university of Helmstedt was founded in 1575 by Duke Julius of Brunswick, and for some time held a high rank among the schools of Germany, but was abolished in 1809. The chief manufactures are flannel, hats, soap, vinegar, and liqueurs. There is a trade in cattle.

HELMUND, or *Helmend*, a river of Afghanistan, which rises between two ridges belonging to the offshoots of the Hindoo Koosh, 35 m. W. of Cabool, upward of 10,000 ft. above the sea. After flowing S. W. for the greater part of its course, it gradually sweeps round to the northwest and west, enters the plain of Seistan, and flows by several branches into the lake of Hamoon, or Zurrah. Its entire length is about 650 m. Its principal affluent is the united stream of the Urgundab and Turnuk, from the east. Even in dry seasons the Helmund has a considerable volume of water.

HELOISE, abbess of the Paraclete, born probably in Paris in 1101, died at the convent of the Paraclete, Champagne, May 16, 1164. Of her parentage nothing is certainly known. In 1116 she was living with her uncle Fulbert, canon of Notre Dame, on the island of the Cité in Paris. At this time Pierre Abélard was at the height of his renown as a teacher, and Fulbert invited him to complete the education of his niece. The teacher and pupil fell in love with each other, and Abélard was compelled to conceal their guilt by conducting his pupil to the home of his parents in Brittany, where she became the mother of a son, who was christened Pierre Astrolabe. (See **ABÉLARD**.) To appease Fulbert, they were married, and at once separated; but to avoid hindering Abélard's ecclesiastical advancement, Héloïse denied the marriage, and was then

obliged to fly from her enraged uncle. Abélard placed her in the convent of Argenteuil, where she took the vows, and soon became abbess. Here she remained for nine or ten years, until a decree of the king, confirmed by the pope, alienated the property of this among other convents, and compelled the nuns to find a retreat elsewhere. The vacant oratory of the Paraclete in Champagne was formally made over to them by Abélard, at that time abbot of a monastery in Brittany, and Héloïse became the first of a long line of noble abbesses. Some years later a papal bull confirmed the gift. The rule adopted by the new convent was that of St. Benedict; but Abélard became the spiritual adviser and the father confessor of his friend, and added some statutes of his own to the ancient rule. Only one personal interview was held; but a correspondence arose which was continued for several years. Abélard died in 1142. Héloïse lived 22 years longer, devoting herself wholly to the enlargement and the discipline of her religious house. She was universally regarded as a saint, and gifts of every kind were brought to her convent. Her remains, after many removals, have rested since 1817 with those of her husband in the cemetery of Père la Chaise in Paris. The letters of Héloïse and Abélard have been many times published. The most complete edition of the originals is by Victor Cousin (4to, Paris, 1849). They form a unique monument of the middle ages, and the internal evidence of their authenticity is so strong as to set aside the supposition of their forgery. The letters of Héloïse especially are called by Hallam "the first book that gives any pleasure in reading produced in Europe for 600 years, since Boethius's 'Consolations.'"—Besides the works mentioned under **ABÉLARD**, see *L'Histoire d'Héloïse et d'Abélard*, by Marc de Montifaud (Paris, 1873).

HELOS, a town of ancient Greece, in the territory of Læconia, situated in a fertile plain near the Eurotas and the sea. Its foundation was ascribed to Helius, the youngest of the sons of Perseus, and in very early times it appears to have been the principal town of that region. On being taken by the Dorians, its inhabitants, as a punishment for the obstinacy of their resistance, were reduced to slavery, and their name, according to some writers, became in time the general designation of the Spartan bondmen. In the age of Strabo Helos had dwindled into a small village, and in that of Pausanias it was a heap of ruins. Its site was probably near Bizani, where there are some Hellenic remains.—Helos at the present day is the name of a district in the plains on the banks of the Eurotas, extending from the mountain of Bizani to the frontier of Maina. Most of the villages of the district are on the low hills which encircle the plain.

HELOTS (Gr. *ἐῷδοτες*), slaves of the Spartans, serfs bound to the soil, and tilling it for the benefit of the proprietors. The three

classes in Sparta were the Spartans, the Peræci, and the helots. The first two were united and constituted one national aggregate, known by the common name of Lacedæmonians; but the last was for ages an entirely separate and inferior class. Several derivations of the name helots are given, including that from Helos, the Laconian town, but perhaps the most probable is that from *ἐλεῖν*, to take, making the name signify captives. They were regarded as the property of the state, which reserved the power of emancipating them, and were attached to the soil, each Spartan citizen receiving the number that belonged to his allotment of land, without any power to sell or free them. With the exception of the few who lived in the city as domestic servants, the helots occupied rural villages apart from their masters, and with only the obligation to till the land and pay a certain proportion of the produce to their masters as rent. The amount of rent was 82 medimni (about 120 bushels) of barley and a proportionate amount of wine and oil for each allotment, which was inhabited by six or seven families. This rent had been established at a very early period, and any increase of the amount was imperatively forbidden. Their number has been variously estimated, but it is certain that, though few at first, they increased through the conquest of rebel towns, till they far exceeded the Lacedæmonians themselves. O. Müller computes their number to have been about 224,000, at a time when the Lacedæmonians numbered but 156,000. They were liable to service in time of war, generally as light-armed troops, and a certain number of them attended on each Spartan. They were also in later times much employed in the navy. Only in particular emergencies did they serve as heavy-armed troops, and then they were generally emancipated after the war. The manumitted helots were not received into the Peræci, but still were a separate class, under the name of neodamodes, or newly enfranchised. Particularly liable to suspicion, they were often employed on foreign service, or among the different trades at Sparta. At the end of the second Messenian war, 668 B. C., the Messenians were reduced to slavery and incorporated with the helots. In 464 the helots revolted, and marched directly against Sparta, which they nearly succeeded in taking. After long and obstinate struggles they were finally subdued. They were constant subjects of apprehension to the Spartans, and were sometimes cruelly massacred, in order to keep down their numbers, the young men being sent out secretly to slaughter them. The most noted of these massacres was in 424, when 2,000 of the helots who had rendered distinguished services in war were slain.

HELPS, Sir Arthur, an English author, born about 1817. He was educated at Trinity college, Cambridge, entered the public service as private secretary to Lord Monteagle, chancellor of the exchequer, and was appointed

commissioner of French, Danish, and Spanish claims. He was afterward secretary to Lord Morpeth, chief secretary for Ireland, in 1859 became clerk of the privy council, and was knighted in 1872. His earlier publications, all of which appeared anonymously, are: "Thoughts in the Cloister and the Crowd" (London, 1835); "Essays written in the Intervals of Business" (1841); two dramas entitled "King Henry II." and "Catharine Douglas" (1843); and "The Claims of Labor" (1844). A work which much enhanced his reputation as a subtle thinker and graceful writer was entitled "Friends in Council, a Series of Readings and Discourses thereon" (1847; 2d series, 1859), a collection of essays with conversations interspersed. It was followed by a similar work entitled "Companions of my Solitude" (1851). His "Conquerors of the New World, and their Bondsmen" (2 vols., 1848-52) was enlarged into "The Spanish Conquest in America" (3 vols., 1855-7), in which he narrates the origin and growth of negro slavery. His later works are: "Realmah" (1868); "The Life of Pizarro" (1869); "Casimir Maremma" and "Brevia, or Short Essays and Aphorisms" (1870); "Conversations on War and general Culture," "Life of Cortes," and "Thoughts upon Government" (1871); "Life and Labors of Mr. Brassey" (1872); "Oulita the Serf, a Tragedy" (1873); and "Ivan de Biron, or the Russian Court in the Middle of the Last Century" (1874). All his writings are marked by a philosophical tone and moral fervor, and Ruskin confesses his obligations to "the beautiful quiet English of Helps." He is understood to have assisted Queen Victoria in the preparation of her "Leaves from the Journal of our Life in the Highlands" (London, 1869).

HELSINGBORG, a town of Sweden, in the län and 32 m. N. N. W. of the town of Malmö, at the narrowest part of the Sound; pop. in 1871, 7,560. It lies just opposite Elsinore, with which there is regular communication. Several battles have been fought here, and several Swedish diets held.

HELSINGFORS, a city of Russia, capital of the grand duchy of Finland, on the gulf of Finland, 180 m. W. by N. of St. Petersburg; pop. in 1870, 32,113. It was founded by Gustavus I. of Sweden in the middle of the 16th century, burned by the Russians in 1728, taken by them in 1742 and again in 1808, and finally ceded to them with the whole of Finland in 1809. The government was transferred from Abo to Helsingfors in 1819, and a few years later the town was almost rebuilt. The streets were laid out with great regularity, public buildings were erected, and it has risen to be a large and handsome city. It has a fine harbor, capable of containing 60 or 70 men-of-war, protected by the fortress of Sveaborg, built on seven islands, presenting a front of about a mile, and mounting about 800 cannon. In 1827, Abo having been burned, the emperor Nicholas reestablished its university at Helsing-

fors. It is now called the Alexander university, and has four faculties, more than 50 professors, and about 500 students. In the senate house is a large and valuable library. The town contains a military academy with about 140 students, a Finnish society of art and one of sci-

again at the time of the first triumvirate, invading Gaul, which had been assigned as a province to Cæsar, under the command of Orgetorix, one of their chiefs. Cæsar routed them at Bibracte (Autun in Burgundy), and the survivors returned beyond the Jura. Numerous



Helsingfors.

Roman castles and colonies were now planted in their land, which was known as Ager Helvetiorum, until it was attached to Transalpine Gaul. Having refused to acknowledge Vitellius as emperor, they were rigorously chastised by his generals. After that the Helvetii almost disappear. Their territory was occupied by the Alemanni, and in its S. W. part by the Burgundians during the last period of the West Roman empire. (See SWITZERLAND.)

HELVÉTIUS, Claude Adrien, a French philosopher, born in Paris in January, 1715, died Dec.

ence, fine museums of mineralogy and zoölogy, botanical gardens, an observatory, and several journals. There are manufactories of linen, sail cloth, and tobacco. The exports are fish, iron, timber, and grain. The trade in grain and in naval stores is active during summer.

HELSINGÖR. See **ELSINORE**.

HELST, Bartholomeus van der, a Dutch portrait painter, born in Haarlem in 1613, died in Amsterdam about 1670. His picture in the town house at Amsterdam, representing 30 full-length figures of a train band, with the Spanish ambassador in the midst, was called by Sir Joshua Reynolds "the first picture of portraits in the world." He occasionally painted historical pictures, but his reputation rests almost exclusively upon his portraits, which are numerous in the Netherlands.

HELVELLYN, a mountain of Cumberland, England, between Keswick and Ambleside. It is one of the highest mountains in England, its summit being 3,313 ft. above the sea.

HELVETII, an ancient people of Celtic origin, who in historical times occupied the country between the Rhine, the lake of Constance, the Rhône, the lake of Geneva, and the Jura; that is, somewhat less than the territory of modern Switzerland (Helvetia). They first appear in history toward the close of the 2d century B. C., when one of their divisions, the so-called *pagus Tigurinus*, joined the Cimbri on their march to invade Italy, and defeated the Roman consul Lucius Cassius (107). After the defeat of the Cimbri and Teutons by Marius, they retired to their territory, where they numbered 12 towns and 400 villages. They left it

26, 1771. He was of German descent, and his name was a translation of Schweitzer. His father was physician to Queen Maria Leeczczynska of France. When scarcely 23 years old, he was appointed farmer general with an annual revenue of about \$60,000. He became the patron of philosophers, wits, and men of letters, and associated with Voltaire, Montesquieu, and Buffon. In order to devote himself exclusively to study, he resigned his office in 1750, married a few months later the countess de Ligniville, and led a retired life, mostly at his country seat of Voré, in the province of Perche. Here, while engaged in the composition of his philosophical works, he labored to improve the condition of the peasantry. In 1758 he published anonymously, under the title *De l'esprit*, a free and bold exposition of materialism, the last word, as an eminent French historian designates it, of the philosophical movement of his age, which was translated into the principal foreign languages. The work was proscribed by the pope, the Sorbonne, and the parliament, and burned by the common hangman; but Helvétius lost nothing of his popularity at home, where his private life and character offset his doctrine. When he visited England and Germany, princes, nobles, and literary men vied with each other to welcome him; he was treated with special distinction by Frederick II., who received him in his own palace. On his return to Voré, he completed a poem, *Le bonheur*, in six cantos, and a philosophical treatise, *De l'homme, de ses facultés intellectuelles et de son éducation*, both of which were published after his death, the latter

by Prince Gallitzin (1772). The best edition of his complete works is that published under the supervision of Lefebvre de La Roche, by P. Didot (14 vols. 18mo, Paris, 1795).—His wife, who contributed much to make his life happy and his home agreeable to friends and visitors, survived him; she retired to Auteuil, near Paris, and her house was still open to philosophers. Dying in August, 1800, at the age of 81, she bequeathed her property to her friend, the celebrated physician Cabanis.

HELVOETSLUIS, or *Hellevoetsluis*, a strongly fortified seaport town of the Netherlands, in the province of South Holland, on the island of Voorne, and on the Haringvleet and the Voorn canal, 6 m. S. of Briel; pop. in 1867, 3,810. It is a very important naval station, with large docks. Thousands of vessels enter the port annually, including the largest Indianmen, which pass through the Voorn canal on their way to Rotterdam. Helvoetsluis was in former times the great point of departure for English ports, and generally for Harwich; and William of Orange embarked here for England Nov. 1, 1688, with 50 war ships and 14,000 men.

HELİYOT, Pierre, a French historian, born in Paris in 1660, died Jan. 5, 1716. He was descended from an English Catholic family that took refuge in France, and in 1683 entered the third order of St. Francis in the convent of Picpus at Paris as Père Hippolyte. He was twice sent to Rome on affairs of his order, and there projected the work by which he is best known, a history of the various religious orders. He was assisted in his researches by Anquetil, Hardouin, Mabillon, Ruinart, and others scholars. Two volumes were published in 1714 (4to, Paris), entitled *Histoire des ordres monastiques, religieux et militaires, et des congrégations séculières de l'un et de l'autre sexe*. The six remaining volumes appeared in 1715, 1718, and 1719. It was reprinted in 1721 and 1792. An inferior edition, edited by Philippon de la Madeleine, appeared at Paris in 1838; and an edition in five volumes in Migne's *Encyclopédie théologique*, with a continuation to the time of publication (5 vols., Paris, 1847). The volumes that appeared after Hélyot's death were edited by Maximilian Bullot. Hélyot wrote also *Le Chrétien mourant* (Paris, 1705).

HEMANS, Fellela Dorothea, an English poetess, born in Liverpool, Sept. 25, 1794, died near Dublin, May 12, 1835. Her father, a merchant named Browne, was a native of Ireland, but her mother was of Venetian descent. When she was five years of age commercial disasters compelled the family to remove to an old mansion at Gwrych, in Denbighshire, Wales, where her childhood was passed. A collection of her juvenile poems was published in 1808, under the title of "Early Blossoms," and met with harsh treatment from the critics. A second volume, entitled "The Domestic Affections," published in 1812, was more successful. In the same year she married Capt. Hemans, by whom she became the mother of five sons. In-

compatibility of tastes and temperaments rendered the union unfortunate, and after Capt. Hemans went to Italy in 1818 to recover his health they never again met, although letters frequently passed between them with reference to the education of their children. Mrs. Hemans now rejoined her mother in Wales, and commenced an active literary life. She studied German and the languages of southern Europe, translated from Camoëns and Herrera, and contributed numerous pieces in prose and verse to the magazines and annuals. About this time she published "Tales and Historic Scenes," "Modern Greece," "Dartmoor," a prize poem, and "The Skeptic." At the suggestion of Reginald Heber she wrote her play of "The Vespers of Palermo," which failed on the London stage, but was well received in Edinburgh. Her works gained her the friendship of many distinguished men. She visited Scott at Abbotsford and Wordsworth at Rydal Mount. In 1831, after a temporary residence near Liverpool for the benefit of her children, she removed to Dublin, where one of her brothers was living. Her last poem was "A Sabbath Sonnet," dedicated to her brother. In 1839 appeared the first collective edition of her poems, with a memoir by her sister (7 vols. 12mo), followed in 1848 by one chronologically arranged (1 vol. 8vo), and by another in 6 vols. in 1850. In 1836 were published "Memorials of Mrs. Hemans," by H. F. Chorley (2 vols. 12mo). Her popularity in the United States dates from 1826, when an edition of her poems, accompanied by a notice of the authoress, was published by Prof. Andrews Norton. Numerous other editions have been published here, one (1850) including an essay on her genius by H. T. Tuckerman. Freiligrath has published an admirable German version (*Das Waldheiligthum*) of her "Forest Sanctuary."

HEMATINE (Gr. *aima*, blood), the coloring matter of the red globules of the blood. Hematine belongs to substances of the albuminoid class, consisting of carbon, hydrogen, nitrogen, and oxygen, with which is associated a small proportion of iron. It forms a little over 1½ per cent. of the substance of the blood globules, but even in this small proportion is sufficient to communicate to them, and to the whole mass of the blood in which they are suspended, the strong and rich deep red color by which they are so readily distinguished. It is rapidly altered in hue by the action of chemical substances, and has not therefore been made available in the arts for the production of dye-stuffs. It is soluble in water, and a very small quantity of hematine will communicate a distinctly red tinge to a very large quantity of fluid.

HEMATITE. See IRON ORES.

HEMIGALE, a mammal of the family *Viverridae*, coming near the ichneumons, so named from its weasel-like body. The grayish brown fur is marked on the back by six or seven wide dark stripes, arranged saddle-wise, broad above and narrowing toward the ribs; the head is

pointed, ears short, hind limbs stout, and tail long. It is a native of the East Indies, is about



Hemigale Hardwickii.

the size of the ichneumon, and feeds on eggs and small birds and mammals.

HEMIPTERA, an order of insects, including what are generally called bugs, harvest flies, tree hoppers, plant lice, &c. They are sucking insects, having neither mandibles nor maxillæ proper, but a horny beak, curved along the breast when not in use, containing in its groove delicate sharp bristles by which their punctures are made. They have four wings, of which the upper are generally thick at the base and membranous at the ends, being as it were half elytra and half wings, whence the name of the order (from *ἡμις*, half, and *πτερόν*, wing); in a few all the wings are membranous, and some are wingless, as the bedbug. The eyes are large, the antennæ generally small, and the tarsi in most three-jointed. They undergo a partial transformation, the larvæ and pupæ resembling the adults except in the absence of wings and the smaller size; in all the stages they live in the same way, and in all are equally active. The bugs or true *hemiptera* (*H. heteroptera*) have the semi-opaque wing covers laid horizontally on the top of the back, crossing each other obliquely at the end; their wings are horizontal and not plaited; the beak issues from the fore part of the head, and is bent abruptly backward beneath the breast. English entomologists have separated the harvest flies, tree hoppers, plant lice, &c., under the name of *H. homoptera*, because the wing covers are of the same texture throughout, either transparent or opaque; they do not cross each other, are not horizontal, but with the wings are more or less inclined at the sides of the body; the beak issues from the under side of the head; the insects of this division live on vegetable juices, while those of the preceding live also upon animal fluids. In the first division, the family *geocorisæ* (Latr.), or earth bugs, have the antennæ exposed and longer than the head; most are terrestrial, but

some live on the surface of water; many emit a disagreeable odor. The genus *pentatoma* (Oliv.), or wood bugs, occur chiefly in warm countries, where they attain a considerable size, and are marked with brilliant colors; they live on vegetable juices, and sometimes on those of other insects; they exhale a disagreeable odor, and adhere to whatever they touch; De Geer relates that the young of the *P. griseum* (Linn.) in troops of 30 or 40 follow their mother on trees as chickens follow a hen. In the genus *coreus* (Fab.) the head is generally triangular, sunk without apparent neck into the thorax; the eyes small but prominent; the legs long and slender; they feed both on vegetable and animal juices, exhale a strong odor, and present often strange forms and spiny armature. Here belongs the well known squash bug (*C. tristis*, De Geer), which emits a powerful odor when handled. In the genus *lygaeus* (Fab.) belong the chinch bugs, so destructive in the fields of corn and wheat at the south and west; the white-winged species (*L. leucopterus*, Say) is provided with wings, and is about $\frac{3}{8}$ of an inch long; the general color is black, with white wing covers margined with black, and reddish yellow legs, beak, and hinder edge of thorax; the young and wingless ones are bright red. Small plant bugs of the genus *phytocoris* are very destructive in flower and vegetable gardens; one species in particular enters into the long list which have been erroneously supposed to produce the potato rot. The genus *syrtis* (Fab.) have a single claw on the anterior feet, with which they seize flies and other insects; the "tiger" so destructive to pear trees in Europe belongs to the genus *tingis* (Fab.); the bedbug (*cimex lectularius*) has been described under *EPIDORA*; a species of *reduvius* is destructive to the cotton crop, staining the balls red, and causing them to fall prematurely; *hydrometra* and some allied species run upon the surface of water, and have been found in considerable numbers in mid ocean in the tropics. In the family *hydrocorisæ*, or water bugs, belongs the genus *nepa* (Linn), commonly called water scorpions, from having the anterior legs in the form of hooked nippers; they prey upon other insects, and are very voracious; in some tribes the posterior legs are much ciliated, resembling oars, enabling them to swim with great swiftness, and often on their backs.—In the homopterous division, the three principal tribes are the *cicadadæ*, already described under **HARVEST FLY**; *aphididæ*, or plant lice, noticed under **APHIS**; and the *coccidæ*, or bark lice, described under **COCHINEAL**. In some of the *cicadadæ*, according to Dufour, the stomach or chylic ventricle is remarkably long, with many convolutions of an intestine-like tube ascending and reopening into its cavity—a remarkable physiological fact. The lantern fly (*fulgora*), said to give forth a light from the end of its prolonged snout, has been alluded to under **FIRE-FLY**. The tree hoppers (*membracis*, Fab.)

have the habits of the harvest flies, but they make no drumming sound, and leap and fly to a considerable distance, even to 250 times their length; they pass their time on plants, always placed lengthwise of the limbs, with the head toward the end of the branches; from their



1, 2 Tree Hopper (*Membracis*). 3. Water Scorpion (*Xepa*).

conical shape, dark color, and fixed position, they look much like the thorns of a tree; locust and oak trees and many vines suffer from the abstraction of their sap by these insects and from the injury done to their leaves. Tree hoppers are often surrounded by ants, for the sake of their droppings or for the sap which oozes from their punctures. The frog hoppers (*cercopis*, Fab.) possess still greater leaping powers; the larvæ extract the sap of alders, willows, &c., in such quantity that it oozes from their bodies continually in little bubbles, whose white foam completely covers them during the period of their transformation; this is called frog spittle and cuckoo spittle. The leaf hoppers (*tettigonia*, Geoffr.) are very small, but handsome, agile, and destructive to vegetation; vines, rosaceous plants, beans, &c., suffer much from their exhausting punctures; tobacco fumigations and the application of whale-oil soap in solution are the best remedies. Some plant lice have the power of leaping, though both sexes, when mature, are winged; these belong to the genus *psylla* (Geoffr.), live on pear and other trees, sucking the juices of the young twigs, and are far less prolific than the *aphides*; these sap suckers are attended by swarms of ants and flies, attracted by the sweet fluid which flows from their bodies; young trees are often killed by them. From the family *coccidæ* are obtained the scarlet grain and cochineal of commerce, now ascertained to be insects or bark lice of the genus *coccus* (Linn.) (see COCHINEAL); the mealy bug of our greenhouses is the *C. Adonidum*; the *C. hesperidum* infests the myrtle. These lice are destroyed by the wren, chickadee, and ichneumon flies; strong soap and alkaline solutions will also kill them.

HEMLING. See MEMLING.

HEMLOCK, a name applied to *conium maculatum* (see CONTUM) and *cicuta maculata* (see CICUTA), as well as to *abies Canadensis* (see

HEMLOCK SPRUCE). It is probable that the hemlock or *κωνειον* which caused the death of Socrates was identical with the plant now known as conium.

HEMLOCK SPRUCE, the common name of the tree *abies Canadensis*, of the order *conifera*, which is quite as frequently called hemlock simply. The hemlock spruces mainly differ from the spruces proper in having flat two-ranked leaves, and the cells of the anthers opening transversely instead of lengthwise; from the firs they differ in having persistent cones and in the wing of the seed remaining attached to it; while in the firs the scales fall from the axis of the cone and the seed separates from its wing. On account of these differences Carrière proposed to place the hemlock spruces in a separate genus, to which he gave the barbaric name *tsuga*; botanists do not accept his views, and regard the firs (*picca*), the spruces (*abies*), and the hemlock spruces (*tsuga*) as subgenera of *abies*. The hemlock spruce is essentially a northern tree. Making its appearance in the southern states only on the mountain ranges, it increases in frequency toward the northern borders of the United States, where large forests of it are not rare, while in Canada it covers vast tracts often without the presence of any other species, and extends to the northernmost limits of arborescent vegetation, and across to the Pacific. It grows in almost every situation except in a very dry one. The hemlock spruce is one of the finest of our native conifers, reaching the height of 60, 80, and not rarely 100 ft.; when it occurs as a solitary specimen, it appears as a fine pyramid of verdure, being furnished



Hemlock Spruce (*Abies Canadensis*).

from the ground to the top with long gracefully drooping branches; but when it grows in the forest the straight trunk is without branches for the greater part of its length. The smaller branches and twigs are very slender; the leaves, about half an inch long

with very short petioles, spread horizontally in two directions, and appear as if in two rows. They are flat, dark green above, and glaucous beneath. The cones are about three fourths of an inch long, of a few scales, greenish when young, but turning brown with age, and placed at the ends of the pendent branches of the preceding year. The wood of the tree is coarse, splits irregularly, and when exposed to the weather decays rapidly; yet with all these disadvantages it affords a large share of the lumber of commerce, and as the white pine disappears hemlock lumber comes more and more into use. It is stronger than white pine, and gives a better hold to nails, and for all work not exposed it is preferred to pine; for beams, rafters, roof sheathing, and all parts of a house to be covered over, hemlock lumber is largely consumed, as it is for a great deal of other rough work. The great economical value of the hemlock is in its bark, which is largely used for tanning leather, either alone or in conjunction with oak bark; large forests have been destroyed by stripping the bark from the trunks, which were left to decay. As an ornamental tree the hemlock is not excelled in beauty by any native or exotic conifer. As single specimens, in a screen, or in a hedge, it is unequalled. For an ornamental hedge it has the advantage over deciduous plants, as it retains its beauty at all seasons; and the manner in which it bears cutting is a sufficient refutation of the common but erroneous belief that plants which naturally grow to large trees are unfit for hedges. The hemlock may be raised from seeds, but nurserymen get their supplies from the forest; young seedlings a foot high are taken up and planted closely together under a temporary screen of brush to shade them; those which survive the first summer are then planted in nursery rows, and afterward may be removed with safety. Hemlock gum, incorrectly so called, is a resinous exudation of the hemlock spruce. The tree while growing contains but little resinous juice; but when it begins to decay, resinous exudations in the form of nodules, from the size of a walnut to nearly that of a hen's egg, are found upon the surface. The bark and chips to which these nodules adhere are boiled in water and the melted resin dipped off. It has a limited use in the preparation of stimulating plasters. In some localities this resin is largely used by the young for chewing, and was formerly sold for this purpose; but at present the most approved "chewing gum" is made from paraffine. The young shoots and leaves afford a volatile oil by distillation, which has a local reputation as a rubefacient. It has been used to produce abortion, with fatal results to the mother.—The Indian hemlock spruce (*A. Brunoniana*), from Nepal, *A. tuga*, from Japan, *A. Mertensiana*, *A. Hookeriana*, and *A. Albertiana*, from the N. W. coast, are species of hemlock spruce to be found in collections of rare evergreens.

HEMP, the common name of the plant *cannabis sativa*, of the order *cannabineæ*, which is by some botanists included in the nettle family (*urticaceæ*) as a suborder. The same name is applied to the fibre of the inner bark, which is largely used in the manufacture of cordage. It is also used for the fibres of plants of widely different genera; for the most important of these, see **MANILA**, **JUTE**, and **RAMIE**. The true hemp is an annual plant, probably a native of India, which has been in cultivation from very early times; it grows from 4 to 12 ft. high, with a branching, angular, rough stem; the lower leaves are opposite, the upper alternate, and all digitately divided, with five or more coarsely toothed leaflets; the flowers are dioecious, and without petals; the staminate flowers in drooping panicles, each with five sepals and stamens, the pistillate clustered in erect spikes, each consisting of an ovary with two styles embraced by a calyx of one sepal. Hemp is a plant influenced in a remarkable degree by



Staminate and Pistillate Flowers of Hemp.

climate, soil, and other conditions; in India it produces a resinous exudation of a marked character (to be presently mentioned), which is entirely wanting in the plant grown in northern climates, and there is a great difference in the hemp produced upon the plains and the mountainous regions in the same latitude; when the plant is so grown that seeds may be developed, the fibre is nearly worthless. In many countries hemp is an important agricultural product. The principal hemp-producing countries are Russia, Italy, Holland, Turkey, Great Britain, the East Indies, and the United States. St. Petersburg exports this product largely, receiving it from various parts of Russia. Special attention is given to its storage and shipment, and great care is taken to prevent the bundles from becoming damp, in which condition the hemp would be liable to ferment as in the rotting process. The best Russian hemp is said to be that of Riga, which is brought

down the Duna. That known as "Italian garden hemp," the fibre of which is obtained from plants raised by spade culture, is of unusual fineness and length, and superior to all other kinds. English hemp is chiefly woven into coarse sheeting and shirting for laboring men, and into the cloth called huckaback, of which coarse towels and table cloths are made. The material improves in whiteness as it is worn, and the finer varieties of it much resemble Irish linens.—Attempts were made at a very early period to cultivate both flax and hemp in the Plymouth colony, the seeds being ordered there in 1629. In Virginia hemp was raised and spun by Capt. Matthews previous to 1648. In 1651 its culture was encouraged by bounties offered by the government, as was that of flax in 1657. But the greater profit derived from tobacco has always operated against the culture of hemp. In Pennsylvania also the bounties offered by the government of the colony in 1730 failed to render this an important crop. Its culture has proved most successful in Ohio, Kentucky, and Indiana, and more recently in Missouri. It has also prospered to considerable extent in the other northern, and in the northeastern states. In the northern part of New York the crop is valued chiefly for the seed, of which from 20 to more than 40 bushels are obtained to the acre. But little American hemp has ever been exported. The product to the acre is from 700 to 1,000 lbs. According to the census of 1870, the total production of the United States was 12,746 tons, of which Kentucky produced 7,777, Missouri 2,816, and Tennessee 1,033 tons.—The soil best suited to hemp is a rich alluvial loam, but it will thrive in a moderately tenacious one if it is well pulverized. It is usually sown broadcast as early as possible without the risk of exposing the young plants to late frosts; four to six pecks are sown to the acre, but if sown in drills less is required. As the plants soon completely shade the ground, no after cultivation is required. It is customary to sow at intervals, that the harvesting may not all come at once. The crop is ready to harvest when the blossoms turn yellow and the leaves begin to drop; formerly the plants were pulled, but now they are cut by means of a heavy cradle, or where they are tall and heavy by means of a sickle or hook something like a brush scythe. The stalks are made to fall evenly, and at the end of three days they are bound into sheaves and put up in stacks or large ricks, so capped as to prevent rain from penetrating. To separate the fibre, the hemp is dew-rotted or water-rotted. In the former process the hemp is spread upon the ground in October or a month or two later, according to the climate; when the lint readily separates upon breaking a stalk, the process, which requires about two months, is completed; if hemp were exposed in this manner in warmer weather, there would be danger of injuring the fibre. In water-rotting the hemp is im-

mersed in water for ten days or more, according to the season; this is done in streams, in artificial pools made near the margin of a river, or in large wooden vats under cover; the last mentioned method gives the brightest and best fibre; when rotted in vats, the hemp is subjected to a partial breaking which lessens its bulk. After the hemp is rotted and dried it is taken to the break, which is either a rude affair worked by hand like a flax break, or an improved machine operated by steam or other power; 100 lbs. is an ordinary day's work with the hand break. After breaking, the hemp is twisted into bundles and baled for market.—When hemp is raised for the seed, the cultivation is quite different from that when raised for the fibre. A richer soil is selected, and prepared as for a crop of corn; hills are marked off about $3\frac{1}{2}$ ft. apart each way, and a dozen or more seeds put in each and lightly covered; the ground is from the beginning kept clear of weeds by use of the cultivator and hoes; when well up the plants are thinned to seven or eight in each hill, and when a foot or more high they are again thinned to leave but four to a hill; subsequently the plants in the hill are reduced to three. As soon as the plants have sufficiently developed to allow the male or staminate ones to be distinguished, these are so far removed as to leave but one to every four hills, and after these have shed their pollen they are cut away. When ripe the seeds are threshed out, and if intended for sowing are kept spread in a thin layer until cold weather to prevent them from heating, which on account of their oily nature they are apt to do. The Russians and Poles roast the seeds and eat them upon bread as a condiment; they are used as food for cage birds, and are said to greatly improve the brilliancy of their plumage, and in the case of the bullfinch and some others to cause it to turn black. Hemp seeds upon expression furnish about 25 per cent. of hempseed oil, the commercial supply of which comes principally from Russia; it is a drying oil, greenish yellow at first, turning yellow, with an acrid odor but a mild taste; it is very soluble in boiling alcohol, but requires 30 parts of cold alcohol for its solution; it solidifies at 17° F. It is used in preparing soap, in mixing paint, for making varnish, and for burning, but on account of its drying tendency it is apt to form a viscid varnish upon the wick.—INDIAN HEMP. The hemp produced in India and other eastern countries is covered with an adhesive resinous exudation, which under favorable circumstances is so abundant as to come off and adhere to the hands if the plant be handled. For a long time it was supposed that this was a different species from the common hemp, and the name *cannabis Indica* was given to it; but Royle and other eastern botanists were unable to find any difference between it and the European plant; and from this and the fact that hemp grown in some portions of India is almost without this resin, botanists

now regard the Indian hemp as only a form of the common, though as a matter of convenience the term *C. Indica* is retained in the pharmacopœias. The stimulant and narcotic properties of Indian hemp have been known from early times; it is known in India by various names expressive of these qualities, such as "causer of the reeling gait," "laughter mover," &c.; and Royle ("*Materia Medica*") suggests that it is as likely as any other plant to have been the nepenthe, the "assuager of grief," of the ancients. The plant and its preparations are found in the eastern bazaars in several forms, some of which are imported. *Gunjah* is the dried plant, collected after flowering, and consists of the stems, leaves, and petioles pressed together; it is also called *guazah*. *Bang*, also *subjee* or *siddhee*, consists of the larger leaves and seed vessels without the stalks. *Hashish* is the tops and the tender parts of the plant gathered after flowering; this name is also applied to some preparations of the plant. *Churrus* is the resinous exudation collected by men clad in leather, who go through the fields and beat the hemp violently; the resinous matter adheres to the leather, and is afterward scraped off. A finer kind, collected by pressing the plant in the hands and removing the adhering resin, is known as the *Momeea* or waxen churrus; this is the most highly prized and costly variety. Extract of hemp is prepared by boiling the adhesive tops in alcohol, which is afterward distilled off, leaving a resinous extract which has a somewhat fragrant odor, and a warm, bitterish, acrid taste; this extract is imported, as also is gunjah. An electuary, made of the resin with musk, essence of roses, and other aromatics, and an oleaginous extract made with butter or oil, are among the forms in which different eastern nations prepare the hemp for intoxicating purposes. The effect of Indian hemp upon different persons is as various as that of alcohol; with some it simply produces stupor, while others experience a mental ecstasy and see the most pleasurable visions. The habitual use of the drug is accompanied by both physical and mental imbecility. The effects of hashish have been frequently described by those who have experienced them. (See ASSASSINS.) Indian hemp has long been used medicinally; a Chinese surgeon is said to have employed it as an anæsthetic as long ago as A. D. 220, and to have operated upon patients while they were under its influence. It is employed as an anodyne and narcotic, and to affect the mental functions; it is considered safer than opium, belladonna, and similar remedies, and it does not check the secretions or impair the digestion; its action seems to be exerted chiefly upon the cerebrum, producing but little effect upon the functions even of the other portions of the nervous system. It is given in the form of the extract, in doses of a quarter of a grain to several grains, or in tincture from 10 to 15 drops.—This name is also applied to an American fibrous and medicinal

plant, *apocynum cannabinum*. (See INDIAN HEMP.)—SISAL HEMP is the fibre of the leaves of *agave Sisalana*, a large species of Yucatan, closely related to the American aloe or century plant. (See AGAVE.) Under the name of Sisal hemp or *jenequen* are included the fibres of probably several species of agave and one or more of *Fourcroya*, the name referring to the product rather than the plants which yield it. An attempt to give the native names of several of the fibre-producing plants of Yucatan may be found in the report of the United States department of agriculture for 1869, but it gives little botanical light upon the subject. Fibres of different agaves and related plants were in use by the Indians long before the Spaniards planted colonies on this continent, and the Spanish Americans have since been content with the rude methods by which the aborigines extracted the fibre, which was simply to lay the large fleshy leaves upon a flat stone and beat them with a billet of wood or rude mallet, and afterward to scrape away the pulp and bruised thick epidermis with a blunt knife. After numerous failures, Americans have contrived machines to separate the fibre successfully and rapidly. *A. Sisalana*, which is propagated readily from suckers, has been introduced into Florida, and become naturalized in the southern portion of the state. Sisal hemp is used for coarse bagging and for cordage.—*Pita* is another name applied indefinitely to fibres; in Mexico it is the fibre of *agave Americana*, while in Central America it is that of some *Bromelia*. *Istle* or *ixtle* is another term for the bromelia fibre.—SUNN HEMP, also called Bengal and Bombay hemp,



Sunn Hemp (*Crotalaria juncea*).

is the fibre of *crotalaria juncea*, an annual leguminous plant, 8 to 12 ft. high, with silvery-hairy leaves and bright yellow flowers. The fibre is extracted by beating and washing the stems after they have been steeped in water for a few days. It is employed for all the pur-

poses of ordinary hemp, to which it is considered equal if not superior.

HEMPEL, Charles Julius, an American physician, born in Solingen, Prussia, Sept. 5, 1811. He studied medicine in Paris, and in 1835 emigrated to the United States, where he has since resided. He graduated at the university of New York, and practised medicine in that city according to the system of Hahnemann. In 1857 he was appointed professor of materia medica and therapeutics in the homœopathic medical college of Pennsylvania, at Philadelphia. He has published "A Grammar of the German Language" (1842); "True Organization of the New Church" (1848); and translations of Hahnemann's *Materia Medica Pura* (4 vols. 8vo, 1846), of Jahr and Possart's "New Manual of the Homœopathic Materia Medica" (1849), and of Jahr's "New Manual" (2 vols.), to which a third volume was added by Dr. Hempel as a separate work, under the title of "Complete Repertory of Homœopathic Materia Medica" (1853). He has also published "A Comprehensive System of Homœopathic Materia Medica and Therapeutics" (1859), "Homœopathic Theory and Practice, with the Homœopathic Treatment of Surgical Diseases," with Dr. I. Beakley (1865), and "The Science of Homœopathy" (1874).

HEMPSTEAD, a S. W. county of Arkansas, bounded N. E. by the Little Missouri, and S. W. by Red and Little rivers; area, about 1,000 sq. m.; pop. in 1870, 13,768, of whom 6,329 were colored. The surface is hilly, the soil sandy and fertile. Red river is navigable by steamboats. The chief productions in 1870 were 1,608 bushels of wheat, 683,425 of Indian corn, 40,541 of sweet potatoes, and 10,664 bales of cotton. There were 1,706 horses, 1,354 mules and asses, 9,399 cattle, 1,986 sheep, and 23,393 swine. Capital, Washington.

HEMSKERK, or **Heemskerk**, **Martin van**, a Dutch painter, born at the village of Heemskerk in 1498, died in Haarlem, Oct. 1, 1574. He was the son of a mason named Van Veen, who placed him under the instructions of a painter at Haarlem, but afterward employed him in his own trade. Martin ran away, found a teacher in Jan Lucas, a painter of Delft, and then entered the studio of J. Schorel, who had recently returned from Rome. At this time Hemskerk painted his "Saint Luke painting the Virgin and the Child Jesus," which he presented to the painters' society of Haarlem. He afterward spent three years in Italy. When in 1573 Haarlem was surrendered to the Spaniards, Hemskerk's house was destroyed, and his best works were ruined; consequently his paintings are rare, but there are many engravings of them by himself and others. At his death he left a sum of money to his parish, to furnish a marriage portion for a certain number of young girls each year, on condition of their dancing over his grave on their wedding day.

HEMSTERHUIS, **I. Tiberius**, a Dutch critic and philologist, born in Groningen, Jan. 9, 1685,

died in Leyden, April 7, 1766. He entered the university of Groningen at the age of 14. At 19 he was appointed professor of mathematics and philosophy at Amsterdam, where in 1706 he published his edition of the *Onomasticon* of Pollux. In 1720 he became professor of Greek at Franeker, and in 1740 of Greek history at Leyden. His works include editions of Lucian's "Dialogues" and "Timon" (1708), and of the "Plutus" of Aristophanes (1744), and "Notes and Emendations on Xenophon of Ephesus" (1784). **II. Frans**, a philosopher, son of the preceding, born in Groningen in 1722, died at the Hague in 1790. He was in the service of the United Provinces as first assistant to the secretary of state. He was a laborious student, and spent his leisure hours in cultivating belles-lettres and philosophy. His complete philosophical works were published at Paris in 1792.

HEN. See **COCK**.

HENBANE (*hyoscyamus*, Tournefort), a somewhat rare but highly dangerous weed, belonging to the nightshades (*solanaceæ*), seen in



Henbane (*Hyoscyamus niger*).

waste places and on rubbish heaps, and on the sites of old houses; remarkable for the singular beauty of its flowers, as well as for its fetid, viscid stems, and clasping, sinuate-toothed, and angled leaves. There are many species of henbane, but the one most common in the United States is an adventitious weed from Europe, *H. niger*. Its seeds are small, flat, kidney-shaped, resembling beans, and suggesting the classic name of *hyoscyamus*, i. e., swine beans, being, it is said, eaten with impunity by the hog, though avoided by other creatures.—*Hyoscyamus* is used in medicine in the form of a tincture, extract, and fluid extract. Its action is very similar to that of belladonna and stramonium, at first diminishing and then increasing the frequency of the pulse, and producing dry-

ness of the throat, headache, delirium, and dilated pupils. The tendency of large doses to produce coma, and of small ones to cause sleep, seems, however, somewhat greater than with belladonna, though by no means equalling opium in this respect. It is used, though not very extensively, in certain nervous affections, as in some forms of neuralgia and insomnia, and occasionally to diminish the irritability that leads to cough. It may be regarded as a succedaneum of opium, though far inferior in power to that drug, and having less action upon the secretions. It is sometimes used in place of belladonna for dilating the pupil. Its activity is due to an alkaloid, hyoscyamia, which is white and crystalline, and forms crystallizable salts with the acids. The dose of the tincture is a fluid drachm or less; of the solid extract, two or three grains; of the fluid extract, five to ten drops.

HENDERSON, the name of five counties in the United States. **I.** A S. W. county of North Carolina, bordering on South Carolina, bounded S. by the Blue Ridge, and drained by French Broad river; area, 425 sq. m.; pop. in 1870, 7,706, of whom 1,208 were colored. The surface is hilly, and the soil adapted chiefly to grazing. The chief productions in 1870 were 4,348 bushels of wheat, 22,298 of rye, 212,914 of Indian corn, 21,101 of oats, 14,960 of potatoes, 22,886 lbs. of tobacco, 14,434 of wool, 82,916 of butter, and 417 tons of hay. There were 825 horses, 2,249 milch cows, 4,347 other cattle, 6,235 sheep, and 9,817 swine. Capital, Hendersonville. **II.** A N. E. county of Texas, bounded E. by the Neches and S. W. by Trinity river; area, 934 sq. m.; pop. in 1870, 6,786, of whom 1,654 were colored. The surface is undulating and the soil fertile and well watered. There is some timber, but the greater portion of the county is prairie. The chief productions in 1870 were 156,804 bushels of Indian corn, 23,075 of sweet potatoes, and 2,967 bales of cotton. There were 1,538 horses, 5,109 milch cows, 11,828 other cattle, 1,345 sheep, and 15,980 swine. Capital, Athens. **III.** A W. county of Tennessee, drained by Beech and Big Sandy rivers, and other streams; area, 780 sq. m.; pop. in 1870, 14,217, of whom 2,408 were colored. It has a nearly level surface, is well timbered, and has a fertile soil, suitable for grain, grass, and the vine. The Mobile and Ohio railroad touches the S. W. corner. The chief productions in 1870 were 41,274 bushels of wheat, 547,805 of Indian corn, 30,736 of sweet potatoes, 15,134 lbs. of tobacco, 15,923 of wool, 142,847 of butter, and 4,191 bales of cotton. There were 2,816 horses, 1,679 mules and asses, 3,649 milch cows, 1,308 working oxen, 5,318 other cattle, 10,168 sheep, and 82,559 swine. Capital, Lexington. **IV.** A N. W. county of Kentucky, separated from Indiana on the N. by the Ohio river, and drained also by Green river; area, 725 sq. m.; pop. in 1870, 18,457, of whom 5,990 were colored. It abounds in coal, has a

hilly surface, and is fertile in grain and tobacco. The St. Louis and Southeastern railroad runs through the county. The chief productions in 1870 were 47,586 bushels of wheat, 739,652 of Indian corn, 6,600,506 lbs. of tobacco, 19,985 of wool, and 84,174 of butter. There were 2,867 horses, 1,656 mules and asses, 2,664 milch cows, 4,355 other cattle, 7,681 sheep, and 19,652 swine. Capital, Henderson. **V.** A W. county of Illinois, bordering on Iowa, bounded W. by the Mississippi, and drained by Henderson river and other streams; area, 390 sq. m.; pop. in 1870, 12,575. It has a diversified surface, occupied by fertile prairies and tracts of timber. Coal and limestone are found. The Chicago, Burlington, and Quincy railroad and Carthage branch, and the Rockford, Rock Island, and St. Louis railroad traverse the county. The chief productions in 1870 were 230,174 bushels of wheat, 96,430 of rye, 1,712,901 of Indian corn, 229,286 of oats, 59,711 of potatoes, 23,317 lbs. of wool, 267,268 of butter, and 12,326 tons of hay. There were 7,075 horses, 4,485 milch cows, 8,797 other cattle, 6,146 sheep, and 27,762 swine; 10 manufacturing of carriages, 6 of saddlery and harness, 1 of woollen goods, 3 distilleries, 6 flour mills, and 2 saw mills. Capital, Oquawka.

HENDERSON, a city and the capital of Henderson co., Kentucky, on the Ohio river, about 200 m. below Louisville, and 150 m. W. of Frankfort; pop. in 1870, 4,171, of whom 1,489 were colored. It is situated in a well timbered region, productive of grain and tobacco, and abounding in coal and salt. Steamers run regularly to Louisville, Memphis, and other points, and the St. Louis and Southeastern railroad furnishes communication with St. Louis and Nashville. Large quantities of tobacco, corn, and wheat are shipped, and there are 16 tobacco stemmeries, a cigar factory, four manufacturing of wagons, two of carriages, two of saddlery and harness, a foundry, car works, a brewery, two distilleries, and three flour mills. The city has handsome fair grounds, water works, six hotels, a fine station house, court house and jail, two public school houses, three weekly newspapers, and 11 churches.

HENDRICKS, a central county of Indiana, drained by White and Eel rivers; area, 389 sq. m.; pop. in 1870, 20,277. It has a level and well timbered surface, and a fertile soil. The Indianapolis and St. Louis and the Indianapolis, Bloomington, and Western railroads traverse it, and the Indianapolis and Vincennes line touches the S. E. corner. The chief productions in 1870 were 376,992 bushels of wheat, 975,825 of Indian corn, 53,501 of oats, 47,620 of potatoes, 70,233 lbs. of wool, 218,526 of butter, and 12,180 tons of hay. There were 7,500 horses, 1,176 mules and asses, 5,492 milch cows, 13,946 other cattle, 21,460 sheep, and 30,380 swine; 16 manufacturing of carriages, 11 of bricks, 5 of cooperage, 10 of saddlery and harness, 3 of woollen goods, 13 flour mills, and 15 saw mills. Capital, Danville.

HENDRICKS, Thomas Andrews, an American statesman, born in Muskingum co., Ohio, Sept. 7, 1819. In 1822 his father settled in Shelby co., Indiana. Thomas graduated at South Hanover college in 1841, studied law at Chambersburg, Pa., was admitted to the bar there in 1843, and returned to Indiana to practice. In 1848 he was a member of the legislature, and in 1850 a delegate to the state constitutional convention. From 1851 to 1855 he represented the Indianapolis district in congress, from 1855 to 1859 was commissioner of the general land office, and from 1863 to 1869 was a member of the United States senate, in which he was regarded as the democratic leader. In the democratic national convention of 1868 in New York, he was strongly supported for the nomination to the presidency. As candidate for governor of Indiana he was defeated in 1860 and in 1868, but was elected in 1872 for the term ending Jan. 1, 1877. He continued the practice of law till his election as governor.

HENGIST, a Jutish prince, founder of the kingdom of Kent, who is said to have died about 488, but whose very existence is doubted by recent historians. He was a reputed descendant of Woden or Odin, and in company with his brother Horsa, with 300 men in three vessels, landed in 449 on the British coast at Ebbsfleet, near Richborough, in the isle of Thanet. Finding the British chieftains in need of assistance against the Picts and Scots, the Saxons agreed to assist in repelling the northern invaders, and, having been reinforced by 1,300 of their countrymen, they defeated them with such slaughter as effectually put a stop to their incursions. Hengist and his brother, perceiving the feebleness of their employers, forthwith sent envoys to their native country, who returned shortly with an army of 5,000 men. They brought with them also Rowena, the daughter of Hengist, who acted as cup-bearer at a feast given by her father to Vortigern, the principal British king. Vortigern became enamored of the Saxon beauty, and demanded her in marriage, to which Hengist consented. The Britons, alarmed at these proceedings, intimated to their auxiliaries that the time was now arrived for their departure. But Hengist and Horsa allied themselves with the northern tribes whom they had lately repelled, and made war upon the Britons, spreading havoc and desolation, according to the Venerable Bede, from the "East sea to the West." The Britons formed a more vigorous system of defence, and, having deposed Vortigern, marched under the leadership of his son Vortimer. Hengist and Horsa were defeated in three battles, Horsa was slain in action at Eaglesford, now Aylesford (455), and Hengist then withdrew to his native country. On the death of Vortimer, Hengist returned with his forces much augmented. He is represented as soliciting a treaty of peace with Vortigern, who had been restored to power among the Britons.

The latter, trusting in the honor of the Saxon, invited his people to a great feast at Stonehenge, where, at a signal from Hengist, a fearful massacre took place. The life of Vortigern was spared; but the result was the speedy conquest of the whole southern country. Meanwhile Ambrosius, a Briton of Roman descent, endeavored to reunite his countrymen. Hengist received large reinforcements, under the command of his brother Octa, and of Ebbisa the son of Octa, who occupied Northumberland. He remained himself in the south, completing his conquests in a great battle at Crayford, in 457. The Britons fled in terror to London, having lost the flower of their warriors, and abandoned Kent. The kingdom which bore this name under Hengist is said to have consisted of the county so called, Middlesex, Essex, Sussex, and part of Surrey, though Sharon Turner restricts it to Kent proper. The victor established his court at Canterbury, and reigned about 80 years. The Britons meanwhile had made several desperate exertions to expel him. Their last effort (473) was conclusive of their destinies, as, suffering a more signal defeat than ever, they are declared to have fled from the Saxons as from fire. The romantic character of the British tradition of Hengist and Horsa has been established by modern historians; and Lappenberg shows that the Anglo-Saxon stories on the subject are purely mythical.

HENGSTENBERG, Ernst Wilhelm, a German theologian, born at Fröndenberg, Westphalia, Oct. 20, 1802, died in Berlin, May 28, 1869. He studied philology, especially the oriental languages, at Bonn. In 1823 he went as a private tutor to Basel, in 1824 became *Privat-docent* of theology at the university of Berlin, in 1826 extraordinary professor, and in 1828 ordinary professor of Old Testament exegesis. He soon acquired a commanding influence in the church by the publication of the *Evangelische Kirchenzeitung* (1827), which was started as the organ of the evangelical party in the church and the conservative aristocratic party in the state. Hengstenberg soon fell out with the theologians who were attached more to evangelical Biblical than to orthodox Lutheran principles, and his journal became more and more the organ of a high-church Lutheran party. The order of freemasons, although the prince of Prussia was known to be one of its chief patrons, was denounced by him as infidel. His principal works are devoted to the interpretation of the Bible, and to the defence of its genuineness, integrity, inspiration, and divine authority, against the attacks of modern critical and skeptical schools. The most celebrated among them is his *Christologie des Alten Testaments* (3 vols., Berlin, 1829-'35; 2d ed., 1854-'7; translated by Dr. Reuben Keith, 3 vols., Alexandria, 1836-'9). His *Commentar über die Psalmen* (4 vols., 1842-'5; 2d ed., 1849-'52; translated into English) is regarded as a masterpiece of orthodox exegetical theology. His other works are: *Beiträge zur*

Einleitung ins Alte Testament (3 vols., 1831-'9); *Die Bücher Moses und Aegypten* (1841; English translation by R. D. O. Robbins, Andover, 1843); *Die wichtigsten und schwierigsten Abschnitte des Pentateuchs* (1842); *Commentar über die Offenbarung des heiligen Johannes* (2 vols., 1850-'51; 2d ed., 1861-'3); *Das Evangelium des heiligen Johannes erläutert* (1862-'3; 2d ed., 1867); *Das Hohelied Salomons ausgelegt* (1853); *Die Weissagungen des Propheten Ezechiel* (2 vols., 1867-'8); *Geschichte des Reiches Gottes unter dem alten Bunde* (2 vols., 1869-'70); and *Das Buch Hiob erläutert* (1870).

HEN HAWK. See HARRIER.

HENLE, Friedrich Gustav Jakob, or Julius, a German physiologist, born in Fürth, Bavaria, July 9, 1809. He studied medicine at Heidelberg and at Bonn, receiving his degree of doctor in the latter place in 1832, and went to Berlin, where he was appointed assistant at the anatomical museum. In 1834 he became professor to the medical faculty of the university, but having been convicted of affiliating with the secret societies of the students called the *Burschenschaften*, he was imprisoned, and, though soon pardoned and released, was not able till 1837 to establish himself in the university as a private tutor. For three years he gave instructions in pathology and in microscopic anatomy, the latter a branch of science which he was the first to develop; and in 1840 he accepted the professorship of anatomy and later of physiology in the university of Zürich. Previous to this he had been a contributor to the "Annual Reports" of Canstatt, and had published *Ueber Schleim- und Eiterbildung* (Berlin, 1838); *Vergleichende Anatomie des Kehlkopfes* (Leipsic, 1839), describing the development of the larynx in animals, from man down to the lowest types of creation; and *Pathologische Untersuchungen* (Berlin, 1840), a series of observations on the nervous system, the periodical nature of certain maladies, miasma, &c. While at Zürich he aided Pfeufer in establishing the *Journal de médecine rationelle*. Between 1844 and 1852 he filled the chair of anatomy, physiology, pathology, and anthropology at Heidelberg. Within this period appeared his most important work, *Handbuch der rationalen Pathologie*. In 1852 he became professor of anatomy and director of the anatomical institute at Göttingen. His employment of the achromatic microscope for anatomical purposes opened a wide and interesting field of observation to scientific men. Among his remaining works are *Handbuch der allgemeinen Anatomie* (Berlin, 1841), and *Handbuch der systematischen Anatomie des Menschen* (3 vols., Brunswick, 1855-'64, and 1868).

HENLEY, John, an English clergyman, better known as "Orator Henley," born at Melton Mowbray, Aug. 3, 1692, died Oct. 4, 1756. He entered St. John's college, Cambridge, at the age of 17, and while an undergraduate addressed to the "Spectator" two letters which

were published in numbers 396 and 518. Having taken orders, he was made assistant curate of the parish of Melton. Soon afterward he was chosen assistant preacher at Ormond street and Bloomsbury chapels, London. In 1723 he obtained the living of Chelmondiston, Suffolk, with the privilege of non-residence; but reports having been spread damaging to his reputation, the bishop ordered him to remove to his parish, whereupon he resigned the living. He now rented a building in Newport market, and fitted it up as a place of worship. "The Oratory," as he called it, was opened in 1726, and for about 30 years he lectured twice a week to large audiences, mainly of the lowest classes of the people. All except those who rented seats were charged a shilling for admittance. He endeavored to found a new sect to be called Henleyarians, and drew up a form of prayer under the title of the "Primitive Liturgy," discarding the Nicene and Athanasian creeds. He also conceived the idea of connecting with his system an enlarged course of liberal education. For some time he edited a weekly journal of nonsense called the "Hyp-Doctor," designed to ridicule the arguments of the "Craftsman," for which he received from Sir Robert Walpole £100 a year. When this gratuity was withdrawn, he became so violent an opponent of government that in 1746 some adherents of the ministry broke up one of his Sunday evening meetings and caused him to be arrested, but he was soon set at liberty. He used to put forth the most preposterous announcements. On one occasion he advertised to teach shoemakers a short way of making shoes, which was by cutting off the tops of ready-made boots. He interlarded his orations with satire, invective, and buffoonery, and accompanied them with all the extravagances of a theatrical delivery. Pope apostrophized him in the "Dunciad." Yet Henley was a man of learning and a diligent student. He wrote a poem entitled "Esther," which is said to contain fine passages; a "Compleat Linguist, or a Universal Grammar of all the Considerable Tongues in Sweden;" a number of pamphlets, various controversial pieces, and the "Oratory Transactions" published in numbers.

HENLOPEN, Cape. See CAPE HENLOPEN.

HENNA, the East Indian name for a shrub of the genus *Lawsonia* (Willdenow), belonging to the natural order *Lythraceæ*, found in Asia and Africa. The genus consists of but a single species, *L. alba*, which, being variable, has received other names. It is 3 or 10 ft. high, and bears abundantly corymbose, white, and very fragrant flowers; the leaves are smooth, opposite, oval, and lanceolate. It is cultivated in India, Egypt, and other eastern countries, where it has been in use as a cosmetic from very early times, the yellow color on the nails of some of the Egyptian mummies being supposed to be derived from henna. It is used by the women to color their finger and toe nails, the tips of their fingers, the palms of the

hands, and the soles of the feet; the men use it to color their beards, and the manes and tails of their horses. It produces a reddish-orange color, which it is said the subsequent application of indigo will turn to black. The leaves and young twigs are reduced to a fine powder, made into a paste with hot water, and spread upon the part to be dyed, where it is usually left over night. The shrub is grown in greenhouses as the Egyptian privet, and is naturalized in the West Indies, where it is called Jamaica mignonette.

HENNEPIN, a S. E. county of Minnesota, bounded E. by the Mississippi, N. W. by Crow river, and S. by the Minnesota; area, about 600 sq. m.; pop. in 1870, 31,566. It has an undulating surface, covered with good timber, and contains Minnetanka lake. The St. Paul and Pacific, the Milwaukee and St. Paul, and the Minneapolis and Sioux City Junction railroads pass through it. The chief productions in 1870 were 379,063 bushels of wheat, 259,418 of Indian corn, 226,361 of oats, 98,863 of potatoes, 333,146 lbs. of butter, 89,414 of maple sugar, 62,800 of flax, and 25,454 tons of hay. There were 3,633 horses, 5,361 milch cows, 1,318 working oxen, 5,449 other cattle, 5,672 sheep, and 5,592 swine; 6 manufactories of agricultural implements, 2 of bags, 8 of boots and shoes, 2 of bricks, 10 of carriages, 11 of clothing, 2 of confectionery, 8 of barrels and casks, 16 of furniture, 3 of iron castings, 7 of machinery, 1 of vegetable oil, 2 of paper, 5 of saddlery and harness, 6 of sash, doors, and blinds, 1 of soap and candles, 8 of tin, copper, and sheet-iron ware, 2 of woollen goods, 14 flour mills, 4 breweries, 3 planing and 23 saw mills, and 5 pork-packing establishments. Capital, Minneapolis.

HENNEPIN, Louis, a Franciscan (Recollect) missionary and explorer of the Mississippi river, born at Ath, Belgium, about 1640, died in Holland subsequent to 1701. After his entrance into the Franciscan order, he made a tour through Germany and Italy, at the close of which he was settled for a year as preacher at Halles in Belgium. His superiors then sent him to Artois, whence he journeyed to Holland, and for eight months had charge of a hospital at Maestricht. At the battle of Senef, between the prince of Condé and William of Orange, in 1674, he was present as regimental chaplain. The next year he was ordered to Canada, and embarked in company with Bishop Laval, whose favor he managed to secure on the voyage, and with the sieur de la Salle. He preached for a while at Quebec. In 1676 he went to the Indian mission at Fort Frontenac, whence he visited the Mohawk country. In 1678 he was attached to La Salle's expedition, and accompanied the chevalier de Tonty and the sieur de la Motte from Fort Frontenac to Niagara, where La Salle constructed the Griffon, a vessel for navigating the lakes above the falls. This accomplished, La Salle on Aug. 7, 1679, began his voyage. He passed through

Lakes Erie, Huron, and Michigan, to the mouth of the St. Joseph's river, ascended this in canoes to the portage, carried them five or six miles to the Kankakee, and floated down this stream and the Iroquois to the Illinois, on which they built Fort Crèvecoeur, a little below the present site of Peoria. Hearing no tidings of the Griffon, which he had sent back, La Salle returned to Fort Frontenac for supplies, charging Michel Acau, Father Hennepin, and one other with a voyage of discovery, the precise object of which is unknown, but making the mouth of the Wisconsin a rendezvous. Hennepin set out in a canoe, Feb. 29, 1680, and followed the Illinois to its mouth. The party then explored the Mississippi till April 11, when they were taken by a party of Sioux and carried up the river to their villages. During this time Hennepin discovered and named the falls of St. Anthony. Daniel Greysolon du Luht had penetrated to the Sioux country by way of Lake Superior, and made peace with the tribe. Hearing that three Frenchmen were held prisoners, he advanced to where they were, and rescued them in July. He took them down the Mississippi to the Wisconsin, and passed up that river and down the Fox, and so through Green bay to Lake Michigan. From Quebec Hennepin sailed for France, where he published in 1683 his *Description de la Louisiane, nouvellement découverte au sud-ouest de la Nouvelle France*, &c. (12mo, Paris), containing the fullest published account of La Salle's first expedition, and of Hennepin's own explorations, with a description of the upper Mississippi. Notwithstanding the writer's vanity and fondness for exaggeration, this work is valuable. Hennepin was now appointed guardian of a convent at Renti in Artois; but refusing to return to America in obedience to his ecclesiastical superiors, he was compelled to leave France, and proceeding to Holland in lay dress sought the favor of William III. of England. In 1697, 10 years after La Salle's death, Hennepin published his extraordinary *Nouvelle découverte d'un très grand pays situé dans l'Amérique entre le Nouveau Mexique et la Mer Glaciale*, &c. (12mo, Utrecht). In this work, which embodies his *Description de la Louisiane*, written anew and enlarged, he asserts that he descended to the mouth of the Mississippi, and was the first European who floated on that river. He gives a journal, description of the scenery, Indian tribes, and the distances along the route, identical with that of Père Membre published by Le Clercq. Hennepin explained his long silence on this important point by saying that he feared the enmity of La Salle, who had ordered him to follow a different course, and who prided himself upon being the first who descended the Mississippi to the gulf of Mexico. Notwithstanding the utter impossibility of reconciling the dates given in Hennepin's narrative, the story obtained general credence until its falseness was exposed by Jared Sparks. (See "Life of La Salle," by

Sparks, in the "Library of American Biography." His third work, published at Utrecht in 1698, *Nouveau voyage dans un pays plus grand que l'Europe*, was a compilation describing La Salle's voyage to the mouth of the Mississippi. Of these three works at least 24 editions appeared in various languages. He endeavored to return to Canada in 1699, but Louis XIV. ordered his arrest if he arrived there. He is said to have been at Rome in 1701, seeking to establish a mission on the Mississippi.

HENNINGSEN, Charles Frederick, an English soldier and author, of Scandinavian extraction, born in 1815. In 1834 he left England to enter the service of Don Carlos in Spain, was a captain in the body guard of Zumalacarreñi, and afterward was made a colonel. Being taken a prisoner, he was liberated on parole. He then entered the Russian army, and served in Circassia. Returning to England, he wrote "Revelations of Russia," which was translated into French (3 vols., Paris, 1845). He afterward took part, on the national side, in the Hungarian war of 1848-9. After its termination he visited Kossuth at Kutaieh in Asia Minor, and followed him to the United States. In 1856 he joined Walker's force of filibusters in Nicaragua. During the civil war he served in the confederate army, with the rank of brigadier general. Subsequently he resided in Washington, and became interested in the cause of Cuba. His principal writings are: "Twelve Months' Campaign with Zumalacarreñi" (Philadelphia, 1836); "The Past and Future of Hungary" (Cincinnati, 1852); "The White Slave," a novel; "Eastern Europe;" "Sixty Years Hence," a novel of Russian life; and "Analogies and Contrasts."

HENRICO, a S. E. county of Virginia, bounded S. W. by James river, and N. E. by the Chickahominy; area, 291 sq. m.; pop. in 1870, 66,179, of whom 31,031 were colored. The surface is diversified with hills of no great height; bituminous coal abounds in the W. part, but most of the soil is light and poor. The James river and Kanawha canal has its E. terminus in this county, and five railroads, viz., the Chesapeake and Ohio, the Richmond, Danville, and Piedmont, the Richmond, Fredericksburg, and Potomac, the Richmond and Petersburg, and the Richmond and York River, radiate from Richmond. The chief productions in 1870 were 81,502 bushels of wheat, 127,166 of Indian corn, 89,601 of oats, 37,634 of Irish potatoes, 10,228 of sweet potatoes, and 2,112 tons of hay. The value of live stock on farms was \$216,497. The principal manufactories were 5 of agricultural implements, 8 of tobacco boxes, 16 of bread, &c., 13 of carriages, 4 of cars, 81 of clothing, 27 of furniture, 1 of gas, 10 of iron, 10 of saddlery and harness, 20 of tin, copper, and sheet-iron ware, 38 of tobacco and snuff, 19 of cigars, 9 printing establishments, 3 flour mills, 1 distillery, 2 breweries, and 2 saw mills. Capital, Richmond, also the capital of the state.

HENRIETTA ANNA, duchess of Orleans, daughter of Charles I. of England and Queen Henrietta Maria, born in Exeter, June 16, 1644, died at St. Cloud, June 29, 1670. She was carried to France while an infant and reared by her mother in a convent at Chaillot. As she grew up she did not please the young king, Louis XIV., her cousin, and was consequently regarded with indifference by the rest of the court. But when her brother Charles II. was restored to the throne of England, a marriage was arranged between her and the French king's only brother, Philip, duke of Orleans. She returned to France from England, whither she had accompanied her mother, and where she first displayed those powers of fascination for which she became celebrated. Her marriage took place on March 31, 1661, at the Palais Royal, and she at once became the delight of the French court. But the charms of madame, as she was called, produced no impression on her husband, and his coolness was changed into aversion after the attentions of the count de Guiche and of the king himself had become so marked as to attract notice. In 1670 the king induced her to visit her brother's court, and through her influence England was detached from the alliance with Holland and Sweden which had been formed in opposition to the interests of France. Shortly after her return she died suddenly in great suffering and in the belief that she had been poisoned. The discourse which Bossuet pronounced at her funeral was considered one of the noblest specimens of his eloquence. Her memoirs were written by Madame de La Fayette.

HENRIETTA MARIA, queen of England, born in Paris, Nov. 25, 1609, died at Colombes, near that city, Sept. 10, 1669. She was the youngest child of Henry IV. of France by his second wife, Maria de' Medici, and on March 30, 1625, was married at Paris by proxy to Charles I., king of England, a few days after his accession to the throne. She soon secured the affection of her husband and acquired great influence over him, but became obnoxious to the English nation by her undisguised partiality for the Catholic faith. She was charged by the king's opponents with being the adviser of his arbitrary policy and the enemy of English liberties. Her unpopularity was increased by her participation in the strife between Charles and the parliament. In 1642 she went to Holland, and procured money and troops, which she undertook to bring to England. Notwithstanding a violent storm, which drove her fleet toward the continent, she landed her forces at Bridlington, and joined her husband at Oxford. In 1644, a few days after being delivered of Henrietta Anna, her last child, at Exeter, she narrowly escaped being taken prisoner by Essex, and went to Falmouth, whence she sailed to France on board a Dutch ship. During her residence in France she suffered from the effects of the hardships she had undergone, and although granted a pension by the French government

she was rendered uncomfortable through the civil dissensions of the country. When Charles II. was recalled to England in 1660, she paid him a visit with her daughter Henrietta Anna, but soon returned to France, where she continued in retirement at her house in Colombes. She died suddenly, and her remains were buried in the abbey of St. Denis, with the exception of her heart, which was intrusted to the nuns of Ste. Marie de Chaillot. Bossuet delivered a funeral oration in her honor. The private correspondence of Henrietta and Charles I. during the civil war was published at London in 1857, edited by Mrs. Green.

HENRIQUEL-DUPONT, Louis Pierre, a French engraver, born in Paris, June 13, 1797. After attending for several years the school of Pierre Guérin the painter, he took to engraving under the direction of Bervic. His principal works are: a full-length portrait of a lady and her daughter, after Vandyke (1822); Gustavus Vasa, after Hersent (1831), the more valuable since the original painting was destroyed in 1848 at the Palais Royal; a full-length portrait of Louis Philippe, after Gérard (1837); "Lord Strafford on his Way to the Scaffold," after Delaroche (1840); "Christ the Consoler," after Scheffer (1841); portrait of Peter the Great of Russia, after Delaroche (1842); the "Hemicycle" of the *palais des beaux-arts*, after Delaroche's fresco (1853); the "Virgin and Child," after Raphael (1855); the "Enshrouding of Our Saviour," after Delaroche (1856); "Moses on the Nile," after the same (1858); the "Mystic Marriage of St. Catharine," after Correggio, the "Pilgrims of Emmaus," after Paul Veronese, and others (1867); and the "Disciples at Emmaus," after Paul Veronese (1869). He is one of the most eminent engravers of France, and succeeded Richomme as member of the academy of fine arts in 1849. At the exhibitions of 1853 and 1855 he obtained the grand medal of honor, and in 1863 he was appointed professor of copperplate engraving at the school of fine arts. He is also a skilful draughtsman, and his exquisite crayon portraits are much sought after by amateurs.

HENRY, the name of ten counties in the United States. **I.** A S. county of Virginia, bordering on North Carolina, and drained by Smith's river, a tributary of the Dan; area, 358 sq. m.; pop. in 1870, 12,303, of whom 5,581 were colored. It has a hilly surface. The chief productions in 1870 were 23,651 bushels of wheat, 154,794 of Indian corn, 75,229 of oats, and 1,129,617 lbs. of tobacco. There were 865 horses, 536 mules and asses, 1,747 milch cows, 2,379 other cattle, 3,442 sheep, and 7,448 swine, and 4 tobacco factories. Capital, Martinsville. **II.** A N. W. central county of Georgia, bounded N. E. by South river, a branch of the Ocmulgee, and drained by several affluents of the latter stream; area, 594 sq. m.; pop. in 1870, 10,102, of whom 3,833 were colored. The surface is diversified and well wooded, and the soil is of middling

quality. Iron, quartz, and a small quantity of gold are found. The Macon and Western railroad passes through the W. part. The chief productions in 1870 were 45,488 bushels of wheat, 166,210 of Indian corn, 16,619 of oats, 22,714 of sweet potatoes, and 4,888 bales of cotton. There were 860 horses, 1,125 mules and asses, 1,897 milch cows, 2,903 other cattle, 3,525 sheep, and 7,648 swine. Capital, McDonough. **III.** A S. E. county of Alabama, bounded S. by Florida, separated from Georgia on the E. by the Chattahoochee river, here navigable by steamboats, and drained by the east branch of the Choctawhatchee river; area, 975 sq. m.; pop. in 1870, 14,191, of whom 4,657 were colored. It has a diversified surface, and a light, sandy, but very fertile soil, drained by many small streams, and in some parts overgrown with pine forests. The chief productions in 1870 were 248,470 bushels of Indian corn, 48,988 of sweet potatoes, and 7,127 bales of cotton. There were 1,240 horses, 1,061 mules and asses, 3,551 milch cows, 7,231 other cattle, 3,953 sheep, and 22,186 swine. Capital, Abbeville. **IV.** A N. W. county of Tennessee, bordering on Kentucky, bounded E. partly by Tennessee river and partly by the Big Sandy; area, 600 sq. m.; pop. in 1870, 20,380, of whom 5,204 were colored. The surface is level and the soil rich. The Louisville and Nashville and Great Southern railroad traverses the county, and the Nashville and Northwestern line passes near the S. W. corner. The chief productions in 1870 were 98,435 bushels of wheat, 767,220 of Indian corn, 26,816 of oats, 31,882 of sweet potatoes, 1,715,001 lbs. of tobacco, 16,459 of wool, 174,000 of butter, and 2,385 bales of cotton. There were 3,658 horses, 2,722 mules and asses, 3,600 milch cows, 4,631 other cattle, 10,878 sheep, and 34,384 swine; 8 manufacturing of carriages, 2 of cotton goods, 6 of tobacco, 6 wool-carding and cloth-dressing establishments, and 7 saw mills. Capital, Paris. **V.** A N. county of Kentucky, bounded N. E. by the Kentucky river, which is here navigable by steamboats; area, 260 sq. m.; pop. in 1870, 11,066, of whom 2,438 were colored. It has an undulating surface, partly covered with forests, and a fertile soil of limestone formation. The Louisville, Cincinnati, and Lexington railroad passes through it. Drennon Springs, on the Kentucky river, is noted as a fashionable resort. The chief productions in 1870 were 57,123 bushels of wheat, 25,516 of rye, 591,528 of Indian corn, 63,913 of oats, 1,375,364 lbs. of tobacco, 26,501 of wool, 114,160 of butter, and 2,879 tons of hay. There were 3,595 horses, 2,376 milch cows, 4,203 other cattle, 6,389 sheep, and 19,080 swine; 2 flour mills, 2 saw mills, and 1 woollen factory. Capital, Newcastle. **VI.** A N. W. county of Ohio, traversed by Maumee river and drained by several of its branches; area, 410 sq. m.; pop. in 1870, 14,028. It has a level surface and a rich soil. The Wabash and Erie canal, and

the Toledo, Wabash, and Western, and the Dayton and Michigan railroads pass through it. The chief productions in 1870 were 175,151 bushels of wheat, 145,522 of Indian corn, 78,190 of oats, 67,847 of potatoes, 80,482 lbs. of wool, 297,973 of butter, and 11,311 tons of hay. There were 3,764 horses, 3,958 milch cows, 4,735 other cattle, 14,692 sheep, and 9,359 swine; 4 manufactories of carriages, 4 of tin, copper, and sheet-iron ware, 1 of woollen goods, 2 flour mills, and 25 saw mills. Capital, Napoleon. **VII.** An E. county of Indiana, having a level or rolling surface, originally covered with dense forests; area, 385 sq. m.; pop. in 1870, 22,986. The soil is fertile and watered by several small streams. The Pittsburgh, Cincinnati, and St. Louis, and the Fort Wayne, Muncie, and Cincinnati railroads traverse it. The chief productions in 1870 were 610,721 bushels of wheat, 1,152,164 of Indian corn, 98,677 of oats, 52,599 of potatoes, 64,953 lbs. of wool, 384,481 of butter, and 10,000 tons of hay. There were 6,894 horses, 4,985 milch cows, 9,385 other cattle, 17,089 sheep, and 33,847 swine; 18 manufactories of carriages, 6 of barrels and casks, 4 of bricks, 12 of saddlery and harness, 2 of sash, doors, and blinds, 5 of tin, copper, and sheet-iron ware, 4 of woollen goods, 11 flour mills, and 17 saw mills. Capital, Newcastle. **VIII.** A N. W. county of Illinois, bounded N. W. by Rock river, and drained also by its affluents, Green and Edwards rivers; area, 830 sq. m.; pop. in 1870, 35,413. It has an undulating surface, diversified with forests and fertile prairies, and contains good building stone and coal. The Chicago, Burlington, and Quincy railroad and the Galva and Keithsburg branch, the Chicago, Rock Island, and Pacific, and the Peoria and Rock Island railroads traverse it. The chief productions in 1870 were 462,824 bushels of wheat, 35,766 of rye, 2,541,683 of Indian corn, 668,367 of oats, 65,760 of barley, 156,734 of potatoes, 40,991 lbs. of wool, 644,494 of butter, and 37,229 tons of hay. There were 11,960 horses, 8,872 milch cows, 15,780 other cattle, 6,266 sheep, and 34,843 swine; 11 manufactories of carriages, 2 of barrels and casks, 5 of furniture, 13 of saddlery and harness, 1 of sash, doors, and blinds, 2 of soap and candles, 6 of tin, copper, and sheet-iron ware, 1 brewery, and 5 flour mills. Capital, Cambridge. **IX.** A S. E. county of Iowa, traversed by Skunk river, an affluent of the Mississippi; area, 432 sq. m.; pop. in 1870, 21,463. The surface is undulating and diversified by prairies and timber land. Coal and limestone are abundant, and the soil is of excellent quality. The Burlington and Missouri River railroad passes through it. The chief productions in 1870 were 219,474 bushels of wheat, 1,095,846 of Indian corn, 231,631 of oats, 99,459 of potatoes, 129,187 lbs. of wool, 490,181 of butter, and 27,991 tons of hay. There were 9,400 horses, 7,003 milch cows, 11,214 other cattle, 30,805 sheep, and 30,855 swine; 2 manufacto-

ries of agricultural implements, 2 of boots and shoes, 19 of carriages, 4 of furniture, 7 of saddlery and harness, 6 of tin, copper, and sheet-iron ware, 1 of woollen goods, 1 tannery, 8 flour mills, and 6 saw mills. Capital, Mount Pleasant. **X.** A W. central county of Missouri, drained by Grand river, an affluent of the Osage; area, 750 sq. m.; pop. in 1870, 17,401, of whom 642 were colored. It has a diversified surface, abounds in coal, timber, and water power, is mostly fertile, and is well adapted to stock raising. The chief productions in 1870 were 239,828 bushels of wheat, 1,167,590 of Indian corn, 298,581 of oats, 34,117 of potatoes, 181,945 lbs. of butter, and 5,167 tons of hay. There were 7,066 horses, 1,256 mules and asses, 5,262 milch cows, 12,157 other cattle, 12,162 sheep, and 27,252 swine; 2 manufactories of bricks, 6 of carriages, 5 of saddlery and harness, 2 of tin, copper, and sheet-iron ware, 2 of woollen goods, and 9 flour mills. Capital, Clinton.

HENRY, the name of several sovereigns of England, France, and Germany.

I. ENGLAND.

HENRY I., surnamed **BEAUCLEUC**, the third English monarch of the Norman line, and first prince of that line of English birth, born at Selby, Yorkshire, in 1068, died near Rouen, Dec. 1, 1135. Having received from his father, William the Conqueror, who died when Henry was 19 years old, £5,000 in silver, he bought from his brother Robert the district of Cotentin, comprising one third of Normandy. On the belief that he was leagued with William Rufus of England, Robert imprisoned him, but released him at the intercession of the Norman nobles. When William attacked Robert in 1090, Henry sided with the latter, and displayed great energy, courage, and cruelty. In the following year William and Robert became reconciled and turned their combined forces against Henry, compelling him to surrender all his possessions. For some years he lived in seclusion, when the people of Domfront, one of Robert's strongest places, called him to rule over them. He made other acquisitions at Robert's expense, became reconciled with William, and went to England. On Aug. 2, 1100, he was hunting in the New forest when William was there slain; and, riding immediately to Winchester, he claimed and obtained the crown, to the prejudice of Robert, who was then in the Holy Land, a leader in the first crusade. Three days later his coronation took place. He owed his success in part to his boldness, and in part to his liberal promises and concessions. He conciliated the clergy, inviting Anselm back to England. He promised to remedy abuses and to maintain the old Anglo-Saxon laws and usages, the charter he granted becoming the basis of all subsequent reforms. By marrying Matilda of Scotland, daughter of Malcolm Canmore and Margaret, and niece of Edgar Atheling, he conciliated the

Saxon but disaffected the Norman portion of his subjects. Robert, returned from the East, landed at Portsmouth (1101) with a considerable force, and summoned Henry to surrender to him possession of England. A negotiation ensued, and Robert, having been guaranteed the undisturbed possession of Normandy, resigned his pretensions to the English throne. But Henry occupied himself for several years in strengthening his position in England, and in 1105 called upon Robert to yield up Normandy also. Robert indignantly refused, whereupon Henry invaded Normandy and captured several places of importance. The next year he renewed his invasion and laid siege to the castle of Tinchebrai. Robert hastened to its relief, and a severe battle was fought beneath its walls. Henry was victorious and took Robert prisoner. The latter having attempted to escape, Henry, according to some authorities, put out his eyes; it is certain that he kept him in prison 28 years. Henry's right to the throne was disputed by Robert's son, whose claims were supported by the counts of Flanders and Anjou and the king of France. Peace was made with France in 1113, and tranquillity was maintained for some years. The question of investiture led to trouble with Rome, which was aggravated by the papal claim to send legates to England. In consequence of the continued troubles in Normandy, and the renewal of the war with the French king, Henry passed much of his time in France, to the discontent of the English. In 1114 he married his daughter Matilda to Henry V., emperor of Germany. The victory of Brenneville decided the war with France favorably for Henry (1119), and peace was made, so that in 1120 his power was established. The same year his son William was lost while sailing from France to England, and the king never recovered from the shock. Queen Matilda had died in 1118, and Henry married Adelicia, daughter of the count of Louvain; no children followed from this union. New difficulties on the continent caused Henry to return there in 1123; success again attended him, and peace was restored. The death of his nephew William in 1128 relieved him from an active enemy. His daughter Matilda returned to England on the emperor's death, and in 1126 her father prevailed on a numerous assemblage of the clergy and laity to swear that, in the event of his death without male issue, she should be recognized as queen and duchess. In 1127 Matilda was privately married to Geoffrey Plantagenet, count of Anjou, and the quarrels between them caused the king much annoyance. The nobility, too, declared that the marriage had absolved them from their oath. The Welsh having given him much trouble throughout his reign, he was about to attempt their conquest when he died. His death was attributed to over-indulgence in his favorite dish, lampreys.

HENRY II., founder of the Plantagenet dynasty, grandson of the preceding, and son of

Geoffrey Plantagenet and the ex-empress Matilda, born in Le Mans in March, 1133, died at the castle of Chinon, July 6, 1189. On the death of Henry I., his nephew Stephen, count of Blois, usurped the thrones of England and Normandy. A long series of contests followed, in the latter part of which Prince Henry much distinguished himself. These were terminated by an arrangement in 1153, by which it was settled that Henry should succeed to the English throne on Stephen's death, which event took place Oct. 25, 1154. Henry had become duke of Normandy in 1150, and count of Anjou and Maine in 1151; and by marrying Eleanor, duchess of Aquitaine, who had been divorced from Louis VII. of France, he obtained in 1152 possession of nearly the whole of southern France. He was his wife's junior by upward of ten years. They were crowned at Westminster, Dec. 19, 1154. Henry's continental possessions comprised more than a third of France, including Normandy, Maine, Touraine, Anjou, Poitou, Guienne, and other provinces; and in a few years he made himself master of Brittany. He brought to the throne a high reputation for talent and courage. He restored the coinage, revoked improper grants, dismissed mercenaries, suppressed lawlessness, and destroyed many of the feudal castles which had been erected in Stephen's reign. But for his troubles with the church, he would have been the greatest, as he was one of the ablest, of English monarchs. These disputes began in 1162. Henry had resolved to curb the clergy, and made Thomas à Becket, upon whom he thought he could rely for assistance, archbishop of Canterbury, he having held the chancellorship since 1158. But Becket became the most austere of churchmen and the most vehement champion of the independence of his order, and placed himself in direct opposition to the king. The first open collision between them occurred at an assembly of bishops called by the king at Westminster in 1163, in which the prelates, following Becket's lead, refused to yield to Henry the customary jurisdiction of the ecclesiastical courts. This led to an attempt to overthrow the whole system of clerical immunities, and for that purpose a convocation of bishops and barons was held at Clarendon, Jan. 25, 1164. The primate, who since the former assembly had been induced to promise unconditional acquiescence, now demanded of the king to make known what these "customs" were, which he and his brother bishops were to observe. A committee of inquiry was thereupon appointed, and the sixteen constitutions or "customs" of Clarendon were drawn up. By these it was enacted that clerks charged with crime should be tried in the civil courts; that no appeals in spiritual causes should be carried beyond the king without his consent; that if, in any lawsuit between a clergyman and a layman concerning a tenant, it was disputed whether the land were a lay or an ecclesiastical fee, this should

be decided by the verdict of twelve lawful men, and if found to be a lay fee, the cause should be determined by the civil courts; that laics should not be accused in spiritual courts, except by legal and reputable witnesses; that no chief tenant of the crown should be excommunicated, nor his lands be put under an interdict, except with the king's consent; that no person, particularly no clergyman, should leave the kingdom without that consent; that the civil courts should decide all suits concerning the advowson and presentation of churches; that the churches belonging to the king's fee should not be granted in perpetuity without his consent; that the revenues of vacant sees should belong to the king, that the election to such sees should be held by the king's consent and in his chapel, and that the bishop elect should do homage to the crown; that goods forfeited to the king should not be protected in churches or churchyards; and that archbishops, bishops, and other spiritual dignitaries should be regarded as barons of the realm, possessing the privileges and subject to the burdens belonging to that rank, and bound to attend the king in his great councils, and assist at all trials. The power of excommunication was lessened, the clerical privileges respecting the collection of debts were annulled, and the sons of villeins were forbidden to be ordained clerks without the consent of their lords. Three copies of these were the next day, Jan. 26, presented for subscription. When the primate was asked to affix his seal, he refused, saying that he had performed all that he had promised. When, afterward, the pope officially disapproved of these constitutions, Becket retracted his former promise. The quarrel between him and the king was renewed, and lasted for seven years, when Becket was killed by four Norman barons (Dec. 29, 1170). During the quarrel Becket was banished, the king of France began hostilities with England, and the war lasted three years. The murder of Becket annoyed Henry, as he feared the pope would carry out his threat of excommunication; but his negotiators succeeded in confining the papal anathemas to those who had committed the crime. In 1171 Henry undertook the conquest of Ireland, the expedition being approved of by a papal bull in 1156, and a few of his subjects having already waged a successful war in that island. He met with little resistance. Having taken a solemn oath that he had not instigated Becket's murder, and having made various concessions to the church, he was confirmed by Rome in the grant of Ireland. The troubles in his family, which clouded the latter portion of his life, now commenced. He had associated with him his eldest son, Henry, in the government of England, Normandy, Anjou, and other territories; Richard was made ruler of Guienne and Poitou; Geoffrey was to be duke of Brittany; and John was to receive Ireland. But from 1173 these sons gave him much vexation, be-

ing encouraged to rebel by their mother, who was enraged by Henry's conjugal infidelities, by the French king, who was the father-in-law of the eldest, and by the nobles in various parts of his dominions. Henry now did penance at the tomb of Becket, fasting and praying there, and submitting to flagellation at the hands of the monks. The Scots, having invaded England, were defeated, and the rebels, including his sons, returned to obedience. The king of Scotland did homage to him, and surrendered portions of his dominion. In the interval of quiet that followed, Henry made several legal reforms. The disputes that broke out in his family were fatal to his peace. His sons quarrelled with him and with each other. The eldest died in 1183, and Geoffrey was killed in 1186. In 1188 Richard rebelled, and was aided by France, though both Henry and the French king had taken the cross, intending to embark for Palestine. Henry was beaten, and submitted to the terms dictated by his enemies. Shortly after he died of a fever brought on by mental irritation.

HENRY III., son of John, king of England, and of Isabella of Angoulême, born Oct. 1, 1207, died at Westminster, Nov. 16, 1272. He became king Oct. 17, 1216, being then but nine years old. The desperate state to which England had been reduced by the misgovernment of John makes the period of the accession of Henry III. the darkest in English history; but, owing to the talents and wisdom of the earl of Pembroke, who was protector, the state of the country was rapidly improved. He confirmed Magna Charta, conciliated the discontented barons, defeated the French both by sea and land, and restored peace. Pembroke soon dying, power passed to the hands of the bishop of Winchester and Hubert de Burgh, the latter being justiciary and having most weight in the government. They had not the influence of Pembroke, and could not control the barons. War was made with France, but it was found impossible to recover the French provinces lost by John. In 1231 the justiciary, who had received large gifts and been made earl of Kent, was overthrown, and Winchester, an able but unprincipled man, monopolized power. He was a Poitevin, and many of his countrymen going over to England, they were intrusted with office, to the discontent of the English of all ranks, whom they oppressed and plundered. This evil was aggravated by the marriage of the king in 1236 with Eleanor of Provence, many of whose countrymen came to England, and shared in the king's bounty. An expedition into France in 1242 terminated disastrously. The pope offered Henry the crown of Sicily for his son Edmund, and the king was involved in debt by his endeavors to support the claim. The chief interest of his reign belongs to the disputes between the king and the barons. These came to a head in 1258, when Simon de Montfort, earl of Leicester, was chief of the baronial party and held possession

of the king's person. The "provisions of Oxford," enacted by the parliament which met there in that year, provided for the election of knights of the shire, four from each, for three sessions of parliament in each year, and for the annual election of sheriffs. Measures hostile to foreigners were also adopted. Government was now in the hands of the barons, who lost the popularity they had once enjoyed. Louis IX. of France made a treaty with Henry in 1259, on terms favorable to the latter. Circumstances enabling the king to renew the contest with the barons, war ensued, and the royalists were defeated at Lewes, May 13, 1264, Henry being taken prisoner. Prince Edward was compelled to make the treaty of Lewes with Montfort, and himself to become a hostage. In January, 1265, a new parliament assembled in London, called by Montfort, to which were summoned two knights from each county, and two deputies from each of certain cities and boroughs, such deputies never having previously been summoned; and the writs were addressed, not to the sheriffs, but to the boroughs. This was the commencement of the house of commons. Prince Edward having escaped from Leicester, the royal party renewed the war, and Leicester was defeated and slain at Evesham, Aug. 4, 1265. The king's authority was reestablished, and tranquillity restored. Henry's reign lasted 56 years, the longest in English history except that of George III.

HENRY IV., founder of the royalty of the house of Lancaster, supposed to have been born at Bolingbroke, Lincolnshire, April 4, 1366, died in Westminster, March 20, 1413. He was the eldest son of John of Gaunt, duke of Lancaster, fourth son of Edward III., and of Blanche, daughter and heiress of Henry Plantagenet, duke of Lancaster, great-grandson of Henry III. His first title was earl of Derby. At the age of 15 he married Mary Bohun, daughter of the earl of Hereford, who was descended from Edward I. In his youth Henry delighted in tournaments and adventures. In 1390 he went to the assistance of the Teutonic knights, serving in Prussia and Lithuania. He then went to Barbary. Returning to England for a season, he set out on a journey to Palestine in July, 1392. He travelled by the way of Dantzic, Königsberg, Vienna, Friuli, and Venice, sailing from the last named place for Rhodes, whence he returned to England in 1393, visiting on the way Venice, Milan, Piedmont, Savoy, and France. Richard II. made him duke of Hereford in 1397. In 1398 he brought an accusation of traitorous designs against the duke of Norfolk, who denied it, and appealed to the trial by battle. The arrangements for fighting were all completed, when the king put an end to the contest, banishing both parties, Norfolk for life, and Hereford for ten years. Subsequently Hereford's term of exile was reduced to six years; but when, on his father's death, he became duke of Lancaster, Richard banished him for life, and seized his immense

possessions. Lancaster resolved to return home, ostensibly to assert his claim to his property, but with the intention of obtaining the crown. This course was advised by his friends. He landed at Ravenspur, July 4, 1399, with a small force, the king being absent on an expedition in Ireland, and declared that his only object was to establish his right to his hereditary possessions; but he became immediately the chief of the opposition that had been created by Richard's follies and crimes, and was joined by persons of all classes, from the Percies to the humblest commoners. Success followed his movements; and when Richard returned he was unable to resist, and became Lancaster's prisoner, resigning the crown, which parliament conferred upon the duke, who thus became Henry IV. (Sept. 30, 1399). The only person who objected was the bishop of Carlisle. The new king affected to trace his right to the crown to his descent from Edmund of Lancaster, who was said to have been the elder brother of Edward I., but to have lost his inheritance from some personal deformity. This claim was not valid, and Henry had only such right as came from conquest and parliamentary election. This defect in his title led him to court the clergy, who were now troubled by the Lollards; and though his father had been the greatest patron and supporter of Wycliffe, Henry became the persecutor of the reformers. The statute *de heretico comburendo* (for the burning of heretics) was adopted in 1401, and it was not allowed to remain a dead letter. Henry's reign was mostly passed amid conspiracies and civil and foreign war, and he spared few of his enemies. He found the Welsh his constant foes, and was more than once attacked by the Scots. The Percies broke with him in 1403, though they had been the chief instruments in his elevation; and the battle of Shrewsbury was fought in July, 1403, and Henry Percy, called Hotspur, defeated and slain. Other attempts were made to depose him, but, though not without great difficulty, the king triumphed over his enemies, Glendower in Wales alone proving unconquerable, though much reduced. An English vessel took the ship on board of which Prince James, heir apparent of the Scotch crown, was going to France, and the prince remained a captive for many years. The feeling between France and England during this reign was extremely bitter, because Richard, who had espoused for his second wife a daughter of the French king, was popular in the former country. Henry became unpopular shortly after his elevation to the throne, though as a subject he had been the favorite of all classes. His first wife died in 1394, leaving four sons, who were among the most eminent men of that age, and two daughters. His second wife was Joanna of Navarre, widow of the duke of Brittany, whom he married in 1403, and by whom he had no issue.

HENRY V., son of the preceding, and second king of the Lancaster branch of the Plantage-

nets, born, it is supposed, in Monmouth, Aug. 9, 1388, died at Vincennes, France, Aug. 31, 1422. But little is known of his childhood. On his father's banishment Henry was seized by Richard II., who took him with the expedition to Ireland, and knighted him. When Richard returned to England, to meet the youth's father, he placed him in the castle of Trim. His father caused him to be liberated and brought to London; and he was created prince of Wales, Oct. 15, 1399. He took part in the proceedings against the insurgent Welsh in 1401, while he was still a boy. He was then appointed to the command of the royal forces in Wales, and was made lieutenant of Wales in 1408. He had a prominent part in the battle of Shrewsbury. On March 11, 1405, he defeated the rebels at Grosmont. The constant rebellion that prevailed in England prevented the king from sending much assistance to his son, and he was thrown upon his own resources, which tended to the development of his character and prowess; and the speaker of the house of commons in 1406 bore testimony to his good qualities as a son and as a man. At the close of 1407 he commanded an expedition that was sent into Scotland, and after some successes made a truce with the Scotch. The house of commons thanked him for his conduct, at the instance of his father. His immediate connection with Wales is believed to have ceased in 1409. He was made warden of the cinque ports and constable of Dover the same year, and captain of Calais in 1410. The king gave him his house of Coldharbor, in London, which accounts for the prince's connection with the city. Councils were there held, at which the prince presided, as he did when they were held at other places. The stories respecting his irregularities, loose life, and association with highwaymen rest upon very insufficient evidence. The prince seems to have been in theory and action above the average morality of his time. The popular idea of him is taken from Shakespeare, whose "Prince Hal" is not the historical Henry of Monmouth, but almost as ideal a character as Hamlet himself. Henry V. was proclaimed March 21, 1413, the day after his father's death. His accession caused great rejoicings. Parliament voluntarily tendered the oath of fealty and allegiance, an act without precedent. He behaved with magnanimity toward the enemies and rivals of his house, particularly in the instance of the earl of March, who was the legitimate heir to the crown. His legislation is not open to the same praise. He continued the persecution of the Lollards; he was attached to Catholicism both from conviction and from supposed interest; and he sent representatives to the council of Constance to help to heal the schism in the church. He determined to renew the claim of the English sovereigns to the crown of France, though it was far less strong in his person than it was in that of Edward III.; and his determination is attributed to the advice of the clergy, who wished

to draw off the attention of the people from church questions, and to save the church's patrimony, the seizure of which had been called for by the house of commons. He first claimed the entire kingdom of France when negotiating an alliance for a marriage with Catharine, daughter of Charles VI.; and when that claim was scouted, the English envoys, waiving it without prejudice to their principal's rights, "demanded the sovereignty of the duchies of Normandy and Touraine, the earldom of Anjou, the duchy of Brittany, the earldom of Flanders, with all other parts of the duchy of Aquitaine, the territories which had been ceded to Edward III. by the treaty of Bretigny, and the land between the Somme and Gravelines; to be held by Henry and his heirs, without any claim of superiority on the part of Charles or his successors. To these demands were added the cession of Provence, and payment of the arrears of the ransom of King John, amounting to 1,600,000 crowns. It was also intimated that the marriage with Catharine could not take place unless a firm peace were also established with France, and that 2,000,000 crowns would be expected as her dower." These monstrous terms were rejected by the French, who however offered to make great concessions. The English parliament strongly supported the king, and the guilt of one of the most unjust wars ever waged lies rather upon the nation than upon its sovereign. Parliament commenced the system of loans for the support of this war. French ambassadors were sent to England to labor for peace, but without success. A powerful force was assembled at Southampton; and a conspiracy was there detected, which was the first act in the contest between the houses of York and Lancaster. The earl of Cambridge, a grandson of Edward III., and the husband of the sister of the earl of March, was at the head of the plot, which had for its object the restoration of the crown to the legitimate line of Clarence. Cambridge and others suffered for their conduct. The expedition sailed from Southampton, Aug. 11, 1415, and reached France in two days. Harfleur was taken, Sept. 22, after a siege of five weeks. Henry challenged the dauphin to a personal conflict, to decide the issue of the war, but his proposition was not accepted. Resolving to return to England by the way of Calais, Henry left Harfleur with a small army, his forces having suffered from sickness, and on Oct. 25 encountered a great French army at Agincourt, which he totally defeated. In a moment of panic, he caused his prisoners to be massacred. He returned to England Nov. 17. The English rejoiced much over the victory, but they found the war very burdensome, and it was not vigorously prosecuted. Sigismund, emperor of Germany, sought to mediate, and visited both France and England; but failing, he joined the latter. Little was done in 1416. In 1417 Henry invaded France again, and met with considerable suc-

cess. The French vainly sought peace. The Scots invaded England, and were beaten. Lord Cobham was captured in Wales, and executed as a traitor and a heretic. Rouen was besieged, and, after a long and terrible defence, was taken Jan. 19, 1419. The duke of Brittany, following the example of the duke of Burgundy, joined Henry. An interview between the French and English authorities having produced no effect, the war was renewed, victory remaining with Henry. The murder of the duke of Burgundy by partisans of the dauphin caused the French king to denounce his own son, and to resolve that Henry should be made regent of France. At the end of November, 1419, an arrangement was made that Charles VI. should remain king while he lived, but that, because of his insanity, Henry should become regent, and, marrying the princess Catharine, should succeed him on his death. An armistice was concluded, from which the dauphin and his party were excluded. The two kingdoms were to be united, and a treaty was made at Troyes, May 21, 1420. The same day Henry and Catharine were affianced, and their marriage took place June 2. A large part of France continued faithful to the dauphin, and he was aided by the Scots, but the successes of the English continued. Henry returned to England, where Catharine was crowned, Feb. 24, 1421. He made a journey to the north, during which he received news of the battle of Beaugé, in which the French and Scots defeated and killed his brother Clarence. Making his brother Bedford regent, he returned to France in the summer, where his usual good fortune in war awaited him; but nothing could overcome the stubborn resistance of the loyal portion of the French nation. Henry had planned a crusade when he was seized with a fatal illness, the exact nature of which is unknown. "Memorials of Henry the Fifth, King of England," edited by Charles Augustus Cole, of the public record office, were published in London in 1858 by the authority of the lords commissioners of the treasury, under the direction of the master of the rolls. "A History of Henry V.," by G. M. Towle, was published in New York in 1866.

HENRY VI., son of the preceding and of Catharine of France, and last monarch of the Lancastrian dynasty, born in Windsor, Dec. 6, 1421, believed to have been killed in the tower in May, 1471. His reign is reckoned as having begun Sept. 1, 1422, the day after his father's death, when he was only nine months old. Parliament declared him king of France and England, and lord of Ireland, and created his father's eldest brother, the duke of Bedford, protector, defender, and chief counsellor of the kingdom and church, and provided that whenever the duke of Bedford was absent, his father's younger brother, the duke of Gloucester, should act in his place. The care of his person and education was confided to the earl of Warwick and to Bishop (afterward Cardinal)

Beaufort. Charles VI. of France having died soon afterward (October, 1422), Henry was also proclaimed king of France in all those parts of that country which were in the possession of the English, while Charles VII. was crowned by the French the same year at Poitiers. A long struggle ensued between the supporters of Henry and those of Charles, in which the English had the advantage until Joan of Arc turned the scale. Henry was crowned at London in 1429 and at Paris in 1431, the protectorate then ending. During his minority there had been much contention between Cardinal Beaufort and the duke of Gloucester, and the king's coronation was a triumph of the former, who then gave to the government a strong ecclesiastical tendency, which was offensive both to the people and to the aristocracy. It was found that Henry had inherited none of the martial qualities of his father. The Beaufort party arranged a match between him and Margaret of Anjou, daughter of René of Provence. The marriage, which took place April 22, 1445, was unpopular in England, both on account of Margaret's relationship to the French king, and because, in return for her hand, Maine and Anjou were surrendered to her father, who claimed them by right of inheritance. A truce which had been negotiated with France was prolonged upon terms considered disadvantageous to England. In 1447 both Beaufort and Gloucester died, and the earl of Suffolk became the most powerful person in the kingdom; he was first created marquis, then duke, and received other high offices and preferments. But as through him both the marriage and the truce had been negotiated, he was greatly disliked. The ill will with which he was regarded was aggravated by disasters suffered in France when hostilities were renewed. Finally his enemies procured his banishment from England, pursued him after he had left it, and had him murdered (1450). His death did not allay the popular dissatisfaction, which rendered Jack Cade's insurrection temporarily successful. Meanwhile the English continued to lose ground in France. In 1451 they had lost all their French possessions except Calais. Popular attention began to be directed toward Richard, duke of York, as the rightful heir to the throne. He was descended from Lionel, duke of Clarence, third son of Edward III., while Henry himself was descended from John, duke of Lancaster, Edward III.'s fourth son. Henry's weakness, and the general unpopularity of the government, encouraged York, who was much loved because of his bravery, mildness, and good conduct both in public and private life, to put forward his claims. His immense possessions gave him vast influence. His wife was a Neville, and he had the support of the ablest members of that family, the earls of Salisbury and Warwick, father and son. So long as no offspring followed from the marriage of Henry and Margaret, it was believed

that York would peaceably succeed to the throne on the king's death. But in 1453 Margaret gave birth to a son whose legitimacy was doubted; and about the same time the king became imbecile. The Yorkists seized the government, overthrowing Somerset, who had succeeded to Suffolk; and the duke was made protector by parliament. On recovering his health, Henry restored Somerset to office, whereupon York levied an army, and demanded reform in the government. The war of the roses then began. The first battle of St. Albans was fought May 22, 1455, and the Yorkists or party of the white rose were victorious. The administration passed into York's hands, and he was king in fact, but Henry's authority was restored in 1456. A partisan quarrel in 1459 renewed the war; and in 1460 the Lancastrians were defeated by Warwick, and the king was captured, at Northampton. York now demanded the throne, and parliament decided that he should succeed to it on Henry's death, and the duke in the mean time administer the government. The queen raised an army in opposition to this arrangement, with which she won the victory of Wakefield, Dec. 30, 1460, in which York was slain. The second battle of St. Albans, Feb. 17, 1461, restored Henry to the hands of his friends; but the victory of Towton, won by Edward, duke of York, now Edward IV., March 29, 1461, compelled him to fly, with his wife and son, to Scotland. Margaret, through foreign assistance, renewed the war in 1463, but was defeated in 1464, and Henry was captured in 1465. He was imprisoned in the tower till 1470, when Warwick restored him to the throne after his quarrel with Edward IV. On the return of Edward, Henry again became a prisoner, and died about May 21, 1471.

HENRY VII., founder of the Tudor dynasty of English kings, born at Pembroke castle, in South Wales, July 26, 1456, died at Richmond, April 21, 1509. On the death of Henry V., his widow, Catharine of France, married Owen ap Tudor, a Welsh gentleman of ancient lineage, but of moderate fortune. Of the four children born of this marriage, the eldest was Edmund Tudor, who was created earl of Richmond by Henry VI., his half brother; and Richmond in 1455 married Margaret Beaufort. John of Gaunt, duke of Lancaster, fourth son of Edward III., had married for his third wife Catharine Swynford, who had long been his mistress. None of their offspring were born in wedlock, but he obtained the legitimization of them all by a papal bull, a charter from Richard II., and an act of parliament. John Beaufort, duke of Somerset, grandson of John of Gaunt and Catharine Swynford, married Margaret, widow of Sir Oliver St. John, *née* Beauchamp, and their only child was Margaret Beaufort, who was married to the earl of Richmond in 1455, and became countess dowager Nov. 1, 1456, three months after the birth of her son. For some years Henry of Richmond resided at

Pembroke castle, even after that place had been given to the Herberts, the chief of whom had charge of him. He was attainted soon after the crown passed to the house of York. His education was conducted by his mother, a woman of piety and learning; and he grew up a thoughtful and serious boy, much inclined to religion. When the house of Lancaster was restored in 1470, Richmond was placed in Eton college, where he was seen by Henry VI., who predicted that he would be king. The next year saw the return of Edward IV., and the death of Henry VI. and his only son, when Richmond became chief of the Lancastrian party. By letters patent from Richard II. in 1397, granted to the duke of Lancaster, the Beauforts were to be "admitted to all honors and dignities," which placed them in the line of succession to the crown; but when Henry IV. ratified the act of Richard II., he added, after the words "all honors and dignities," the words "except to the royal dignity." Thus the Beauforts were not from the first excluded from claims to the throne, and Henry of Richmond had plausible ground for asserting that he was the lineal heir of John of Gaunt, and head of the house of Lancaster. Henry was sent to Pembroke castle after the triumph of the Yorkists, and going to Tenby, sailed thence to France. Landing in Brittany, he was seized by the duke of that country, who held him a prisoner many years, refusing to surrender him to Edward IV. In 1484, when the usurpation of Richard III. had caused much discontent in England, Henry was recognized as chief of all parties opposed to the government, and a marriage was arranged between him and Elizabeth, eldest daughter of Edward IV. The duke of Brittany finally liberated him, and with a small force he sailed for England. He was unsuccessful, his fleet dispersed, and his party in England was crushed for the time by Richard. After a variety of romantic adventures, he raised a larger force, sailed from Harfleur in the beginning of August, 1485, and landed at Milford Haven. The victory of Bosworth (Aug. 22) and the death of Richard III. made him king. He was crowned at Westminster Oct. 30. Parliament settled the succession on his heirs. He married the princess Elizabeth in January, 1486, but her coronation did not take place until the close of 1487. Henry's reign was much disturbed by pretenders and plots. The first pretender was Lambert Simnel, who claimed to be the earl of Warwick. The true earl was a prisoner, and the pretender was exposed; but an army was raised, which at Stoke (June 16, 1487) disputed the day with the royal forces, and placed the Tudor cause in great peril. Victory at length declared for Henry, and the Yorkists lost all their leaders on the field. The king, with good-natured contempt, made Simnel a turnspit. A more formidable competitor was Perkin Warbeck, who claimed to be Richard, duke of York, second son of Edward IV.; and the assistance he received from Burgundy,

France, Scotland, and Ireland alarmed Henry. He detected a conspiracy among the nobility, and put the leaders to death, including Sir William Stanley, to whom he owed the victory of Bosworth and the throne. A Cornish rebellion, caused by taxation, was put down at Blackheath, June 22, 1497. To revive this rebellion, Perkin went to Cornwall, but failed, and fell into the king's hands. Henry had him set in the stocks, and forced him to admit that he was an impostor, he reading the confession which he had written with his own hand to the people assembled in Cheapside. He was then confined in the tower, and, after an attempt to escape, was hanged at Tyburn in 1499. Warwick, who had shared in the attempt, and had been the object of a third plot, was beheaded, a deed as foul as any that has been attributed to Richard III. Henry's motive was to satisfy Ferdinand of Aragon, who would not give his daughter Catharine to the prince of Wales while any Yorkist prince remained on earth. The son in behalf of whom this act was committed died in 1502. Henry became very avaricious in his last years, and by the revival of old laws and other means amassed £1,800,000, according to some accounts, which are perhaps exaggerated. He extorted money from his subjects under pretence of making war on France, which they demanded, but which he knew better than to undertake. He sold pardons, and drove a trade in offices of the court and the church. The two most noted instruments of his avarice were Empson and Dudley. In the 11th year of his reign the statute for the security of the subject obeying and aiding a king *de facto* was passed, which was made necessary by the judicial slaughter that had occurred among the aristocracy while the contest between the houses of York and Lancaster distracted England. Seven years earlier was passed the statute of fines, which was but a copy of that of Richard III., and probably reënacted only to give validity to that monarch's laws. The clergy were not friendly to Henry, and in each case of a pretender a priest was concerned. Yet he followed the policy of the house of Lancaster, causing at least two Lollards to be burned, and severely persecuting many others. He sought the reform of the church, and in his reign we find the first indications of that course which, in his successor's time, ended in the English reformation. Henry encouraged commerce and patronized voyages of discovery. His foreign policy was judicious; and by marrying his eldest daughter to James IV. of Scotland, he furthered the ultimate union of the two kingdoms. Worn out with anxiety and care, he died before the end of his 53d year.

HENRY VIII., second king of England of the Tudor dynasty, and second son of the preceding king and Elizabeth of York, born at Greenwich palace, June 28, 1491, ascended the throne April 22, 1509, died Jan. 28, 1547. His father intended that he should become the

head of the English church, and was educating him for the office of archbishop of Canterbury, when the death of his elder brother, Arthur, made him heir apparent, April 2, 1502. Arthur had married Catharine of Aragon, daughter of Ferdinand and Isabella, receiving with her 200,000 crowns, one half of which was paid down; and on his death her parents desired that she might be sent home, and the money refunded. Henry VII. objected, and proposed that Catharine should marry the new prince of Wales, who was five years her junior; and she was betrothed to him, June 25, 1503. Two years later the prince read and signed a protest against this contract, in presence of his father's councillors, declaring that he did not mean to fulfil it. This was the work of his father, who wished to marry Juana, widow of Philip I. of Castile, and elder sister of Catharine. Henry VII. probably altered the date of the protest at a later period, so as to disguise its object. The prince of Wales was at that time attached to Catharine, and a dispensation had been granted by the pope as early as 1504, allowing them to marry, on the ground that the marriage with Prince Arthur had not been consummated. The king, who was always conscientious when ill, appears at times to have had some scruples on the subject of the marriage, and would have restored the princess to her parents, but that he could not bear to part with her portion. He died, and in less than two months Henry VIII. and Catharine were married. This hasty marriage was made, in the first instance, at the king's desire, but it was probably urged on by most of the statesmen around him because of their anxiety to establish the succession. The wars of the roses in the preceding century had made an indelible impression on the English mind, the effect of which was visible throughout the entire history of England during the existence of the house of Tudor, and to which must be attributed much of their vicious conduct. Should Henry VIII. die without an heir, there would ensue an immediate contest for the crown between the houses of York and Tudor, both represented by women; the former by the countess of Salisbury, a daughter of the last duke of Clarence, brother of Edward IV., and the latter by the daughters of Henry VII. Archbishop Warham opposed the marriage, on the ground of their relationship. Bishop Fox argued in its favor, though it was under his direction that the king when prince of Wales had protested against it. The privy council recommended the marriage. It was solemnized at Greenwich, June 7, 1509, and they were crowned June 24. Few monarchs have been more popular than was Henry at his accession. He was the heir of both branches of the old royal house, his father representing that of Lancaster, and his mother that of York. His person was eminently handsome, his mind had been highly cultivated, and he was fond of martial pleasures. He gave up

Empson and Dudley, the obnoxious ministers of the late king, to vengeance, together with their instruments. He returned fines that had been unjustly or oppressively exacted. Much was hoped and expected of him, and not altogether in vain. Though addicted to pleasure, he was not unmindful of business, and paid special attention to foreign affairs. His manners were pleasing, yet he evinced at an early period not a little of that obstinacy which became his chief trait in later life. He is often spoken of as a lavish prince, but Wolsey said that he was the most avaricious man in the world. Had he died within 20 years from his accession, he would have been the most popular monarch in English history. His foreign connections began early. In 1510 he received the golden rose from Pope Julius II., who wished to obtain his aid to expel the French from Italy; but at first he was disposed to be moderate, and to pursue substantially the policy of his father. He made a treaty with France, and then entered into engagements with his father-in-law, guaranteeing his Spanish dominions against the French, and sent an ambassador to Rome to promote a pacification. Gradually he was drawn into the war on the side of the pope and Ferdinand, and English forces were sent to their assistance. Late in 1511 a league was formed against France by the pope, the emperor, Aragon, and Venice. Henry led a large army into France in 1513, after his fleet had been checked and the French had threatened the English coast. Maximilian I., emperor of Germany, served under him as a volunteer. Great things were expected from this invasion, but were not realized. The French were beaten in the battle of the spurs (at Guinegate), an unimportant skirmish, remarkable only because Bayard was then captured; and the English took Théroutanne and Tournay. Henry then returned home with most of his forces. Louis XII., hoping to intimidate Henry, had called the duke of Suffolk, one of the nephews of Edward IV., to France, whereupon Henry caused Suffolk's brother to be put to death, after he had long been detained a prisoner. While the king was in France, James IV. of Scotland led a great army into England, which was totally defeated at Flodden by the earl of Surrey, Sept. 9, 1513, and the Scottish king slain. Being deserted by his allies, Henry made peace with Louis XII., who married his sister, Mary Tudor; but the French king soon died, and Mary married Charles Brandon, duke of Suffolk. Wolsey, whose career had commenced in the preceding reign, was now high in favor with the king, and his course on many occasions gave much offence to the nobility. The successes of Francis I. in Italy alarmed Europe, and the German emperor sought to engage Henry to act against France by holding out hopes of being made his successor; and Francis, in retaliation, formed plans for an invasion of England in support of Suffolk's claim to the

throne. This pretender was an object of terror to the English government until he was slain at the battle of Pavia. The successes of the Turks continuing to alarm the western nations, Henry listened to the pope's plans for a crusade. On the death of Maximilian I. Henry thought of becoming a competitor for the imperial crown, but soon discovered that he had no chance of success. The election of Charles of Spain to the imperial throne caused Henry and Francis to become friendly, and in 1520 a meeting was arranged between them. Before it could be held, Charles V. visited England, and there gained the influence of Wolsey, by affecting to favor his aspirations to the papedom. Francis and Henry then met near Ardres, on territory belonging to the latter, though in France. The meeting was so magnificent that the place of it was known as the field of the cloth of gold. Henry visited the emperor at Gravelines, where Charles completed his conquest of Wolsey by conferring Castilian sees upon him. War breaking out between Charles and Francis, Henry was induced by Wolsey to favor the former, and to enter into an offensive alliance with him. In 1521 Henry received from Leo X. the title of defender of the faith, for having written a book against Luther and his doctrines. The same year occurred the execution of the duke of Buckingham, one of the greatest nobles of the realm, and descended in the female line from Edward III. His death was attributed to Wolsey, but it was due to the jealous rage of Henry, who could not bear about him any one who had, or could pretend to have, claims to the succession in the event of his dying without issue. The death of Leo X. and the elevation of Adrian VI. endangered the alliance between Charles V. and Henry, because of Wolsey's disappointment; but the emperor visited England, soothed the cardinal, and prevailed upon the king to declare war against France. An English army, commanded by Surrey, invaded France, but did nothing beyond burning and pillaging a few places of little note. Francis I. again called forth the pretender Suffolk, and threatened England with invasion; and these threats, and the alarm they caused, show that the party of York was still formidable in that country, a fact that palliates many of the king's acts. Henry was a party to the conspiracy of the constable de Bourbon against Francis in 1523; and from this conspiracy he expected to become as powerful in France as Henry V. had been. But the failure of the plot ruined Bourbon, while an English army, commanded by Brandon, duke of Suffolk, performed as little in France as had been done by that of Surrey. The death of Adrian VI. in 1523 excited anew the hopes of Wolsey, but Charles V. threw his influence into the scale of Cardinal de' Medici, who became Clement VII. This disappointment determined Wolsey to withdraw his master from the imperial alliance; but not until after the battle of Pavia was he able to accomplish his

purpose. Henry was at first disposed to prosecute the war more vigorously than ever against France, and Bourbon showed that he could obtain the crown of that country; but Wolsey's policy prevailed, much aided by the emperor's conduct, as he evinced a disposition hostile to English aggrandizement. A treaty of peace was made with France in August, 1525, on terms advantageous to England. In 1527 Henry and Francis formed an alliance for the expulsion of the imperialists from Italy, and the deliverance of the pope, who was the emperor's prisoner. Henry renounced all claims to the French throne, and Francis agreed to pay 50,000 crowns annually to Henry and his successors. Wolsey made a magnificent journey to France, which the public associated with the thought of Henry's divorce, with a view to his marriage with a French princess; and from this time, the spring of 1527, the question of divorce becomes the leading incident of Henry's reign. His marriage with Catharine had not been productive of heirs. During the first nine years of their union, the queen had thrice miscarried, two sons died immediately after birth, and a third son was still-born. The only child that lived was the princess Mary, born in 1516. Henry, who was superstitious even to fanaticism, was much impressed by these repeated misfortunes, and believed they were punishments for having married his brother's wife. The idea of a divorce had perhaps been maturing in his mind for years, when accident gave it sudden prominence. The marriage of the princess Mary with a French prince being spoken of as probable, the legitimacy of the princess was questioned by the French envoy, the bishop of Tarbes. This the king asserted in council, but it has been doubted whether the bishop ever raised any such question. At this time the pope was suffering from the attack of the imperialists, and soon became a prisoner of the emperor, and Wolsey determined to procure a divorce, in the hope of being able to commit Henry thoroughly to the cause of the ancient church, which was beginning to feel the attacks of the reformers. Apart from the theological reasons which deterred the pope from granting a divorce, he had to dread the resentment of the emperor, who was Catharine's nephew. Wolsey aimed at a reformation of manners in England, and he hated the emperor because of his repeated appointments respecting the papacy; and in both the ends he proposed to effect, the moral reformation and the divorce, he had a good right to count upon the pope's assistance, as matters stood in 1527. But it was impossible that the pope should continue to be the open enemy of the emperor; and unless he should so continue, his aid in the divorce question could not be counted upon. The alliance with the emperor was popular in England, he being ruler of Flanders, with which country England had a great and profitable commerce. The emperor himself was at that time popular in Eng-

land; with the reformers, because he was at war with the pope; with the conservatives, because they knew his position necessarily made him the champion of the old order of things, though circumstances had for the time made him their apparent enemy; and generally, because he was the foe of France, England's old rival. Wolsey triumphed over all these obstacles, by convincing Henry that by a change of foreign policy he could cause the pope to grant the divorce he so much desired; and in his correspondence with the English agent at Rome, he declared that the king would disregard the wishes of his subjects and the private interests of his realm, to attach himself cordially and constantly to the holy see, provided the pope should prove his friend in the matter he had so much at heart. That Henry was in part governed by religious feeling, and also by considerations growing out of the subject of the succession, cannot reasonably be doubted; but his attachment to Anne Boleyn, which began some years before the open agitation of the divorce question, was the real occasion of his wish to put away his wife, Anne being resolute in her determination not to be his mistress. Wolsey was opposed to the proposed marriage with Anne, and the king, without his minister's knowledge, sent his secretary to Rome, with a private proposition that a dispensation should be granted, allowing him to take a second wife, the former marriage to stand with no definite sentence passed upon it; or, if that were impossible, leaving the pope to proceed after his own ideas, the main object to be kept always in view. Wolsey's plan was that the pope should extend his (Wolsey's) legatine authority so far as to grant him full power to act as English vicegerent so long as Rome should be held by the emperor's forces. Soon, however, the public and private agents acted together, and the pope was urgently desired to do that which Henry asked. For years he played a double game, though warned by Wolsey and others of the evil that must follow to Rome from his failure to favor Henry. In 1528 Cardinal Campeggio was appointed to proceed to England, to hear the cause in conjunction with Wolsey; but he purposely delayed his journey, and had instructions not to decide the cause. He endeavored to persuade the king to give up his wish, and failing, sought to induce Catharine to take the vows of chastity, and to retire from the contest; but that lady, who was singularly tenacious of her rights, would consent only on condition that the king should take the same vows. Henry, now convinced that only bold measures would answer, avowed his intention to make Anne Boleyn his wife, and installed her in Greenwich palace. He sent a relative of the lady to Rome, to announce that his request must be granted, menacing that, if he failed with the pope, the whole matter should be laid before parliament. The emperor sought to intimidate the king; but Henry summoned a meeting of

nobles, merchants, and others, at London, before whom he placed the reasons of his conduct, and appealed to the patriotism of his subjects, with success. The imperial threats and intrigues proved very injurious to the queen's cause. The legatine court was prevented by trickery from acting until May, 1529, and then Catharine appealed to Rome, to which Henry was summoned. Against this Wolsey protested, declaring that if Henry should go to the court of Rome, it would be with such a force as should be formidable to the pope and all Italy. A parliament was immediately called, and power passed into the hands of new men, though of the old aristocracy, and Wolsey's enemies, and opposed to the rule of the church, yet not reformers in every case. At that time there were three parties in the country: the English party, in whose hands was power, and who were determined upon a secular revolt; the papal party, the chief member of which was Sir Thomas More, now chancellor; and the doctrinal Protestants, who were disliked by both the others. Wolsey gave up the seals Oct. 17, 1529, and parliament met Nov. 3. The fact that the opening speech was made by More, an extreme Catholic, standing at the king's right hand, shows that Henry had even then no wish to break with Rome. Wolsey was coarsely reflected on by the chancellor. Parliament was left to pursue its own course, and it proceeded to denounce the clergy in a formal "act of accusation," or petition, which contained the germ of the English reformation. Henry submitted this to the bishops, who replied at length, but ineffectually, as the commons passed several laws respecting the powers and privileges of the clerical order; and the lords concurred, though the clergy formed a majority of the upper house, which shows that the pressure was great from without. The divorce question continued under discussion, and the pope issued two inhibitions, threatening Henry with spiritual censures if he should proceed. The king thought at one time of giving way, and most of the council agreed with him; but Thomas Cromwell induced him to persevere. Henry hoped the conduct of parliament would intimidate the papal court. The right of the pope to grant that dispensation under which the marriage of Henry and Catharine had taken place was called in question, the object being to transfer the matter to a broader court, and to obtain in some way, as through an appeal to a council, a decision against the marriage. This is said to have been suggested by Cranmer, who made himself very prominent in obtaining the opinions of universities and learned men on the subject, and who belonged to the embassy of the earl of Wiltshire, sent to the emperor at Bologna in 1530. This embassy failed to move Charles. The pope still affected impartiality, and allowed free expression of opinion on the marriage in Italy; but his sole object was delay, and Spanish influence was exerted in the queen's

behalf. In Catholic countries, the sentiments of learned men and other authorities on the dispensing power were about equally divided. The Protestants, including Luther, were generally hostile to Henry. In France and England Henry's cause triumphed, because all the influence of both governments was used in its behalf. The entire proceedings were scandalous. Wolsey had been prosecuted under the statute of provisors, and had died in disgrace; and it was determined to proceed against the higher clergy, but less in the spirit of justice (for the whole nation shared in their guilt) than to obtain an opportunity to strip them of some of their property, and to lessen their power. Convocation met in 1531, and consented to pay a fine of £118,000. In the preamble to their subsidy bill the clergy were compelled to acknowledge Henry as "protector and only supreme head of the church." They were then pardoned. The divorce question was first brought before parliament in 1531, when the opinions of the universities were communicated to it. The house of peers sent a remonstrating letter to the pope, warning him of what would follow if a divorce should not be granted. Catharine was asked if she would withdraw her appeal to Rome, and on her firm refusal she was removed from the court. In 1532 parliament proceeded in the work of clerical reform, taking its first step toward a breach with Rome by the abolition of annates, which originated with the clergy, who, to preserve their own power at home, were ready to go any length against Rome, even while persecuting Protestants most intolerantly. Parliament was more moderate, and passed the act conditionally. From this time dates "the Anglican schism," the convocation praying to the king, "May it please your highness to ordain in this present parliament that the obedience of your highness and of the people be withdrawn from the see of Rome;" that is, if the pope should insist upon the payment of annates. But this did not prevent parliament from limiting the legislative power of the convocation, in spite of the clergy's opposition. Meantime the nun of Kent and other fanatics were inciting the people to opposition to the government, and a powerful party hostile to change was forming itself. Sir Thomas More resigned the chancellorship; and Archbishop Warham, after protesting against the doings of parliament, died. An offensive and defensive alliance between Francis and Henry was formed in 1532; the former agreed to send 15,000 troops to England, should the emperor invade that country; and he assisted Henry in various ways. Scotland gave England much trouble at this time. The English court visited that of France at Boulogne, and Francis made great promises of support, and advised Henry to marry Anne Boleyn on his return to England. New efforts were made to move the pope, but though he often affected to favor the king, and made some suggestions implying a desire to gratify

him, he could not be prevailed upon to do anything. At length Henry married Anne Boleyn, Jan. 25, 1533, according to the generally received account, though it was believed that a secret marriage had taken place in the preceding November. A papal brief soon appeared, declaring Henry and Anne excommunicated, unless they should avoid all intercourse pending the decision of the divorce, the marriage being kept secret. Parliament met, and passed the act of appeals (April 12), directed against the papal authority, and intended to bear against Catharine's appeal to Rome. This took the matter before the convocation, and that body, on Cranmer's application, decided that Pope Julius II., in granting a license for the marriage of Henry and Catharine, had exceeded his authority, and that the marriage was therefore *ab initio* void. Cranmer then demanded the king's permission to proceed with the case, which being granted, he opened his court at Dunstable, and summoned Catharine to appear. She refused, and was pronounced contumacious, and the trial proceeded. Judgment was rendered May 23, 1533, the marriage being declared null and void from the beginning. Nine days later the coronation of Anne took place, and it was announced to Catharine that she should no longer be called queen, but princess dowager. There was much discontent, and the emperor, whom Henry in vain sought to appease, believed there would be an insurrection, and urged Catharine not to carry out her design of flying to Spain with her daughter. On May 12 Henry was summoned to appear at Rome, but he appealed to a general council. News of the divorce threw the pope into a rage, yet he contented himself at the time with a conditional excommunication, declaring Cranmer's judgment illegal, and giving Henry more than two months for repentance and restitution. Henry stood firm, but Francis failed to support him, and he had to look to the German Protestants for sympathy; and he sent an envoy to the elector of Saxony, with no effect. The princess Elizabeth was born Sept. 7, 1533. Conspiracies against the king were formed, implicating both Catharine and her daughter Mary; and the throne was in much danger from the ambition of some parties and the fanaticism of others. Government acted vigorously, and it was determined to form a Protestant league. Parliament met in January, 1534, and took a variety of measures to increase the separation of Rome and England, under Cromwell's lead. The papal authority was conditionally abolished in England. An act of succession was passed, settling the crown upon the children of Henry and Anne. At length the pope gave sentence, deciding against Henry, declaring him excommunicate, and freeing his subjects from allegiance. The emperor was to enforce the sentence, and invade England within four months; and preparations to that end were at once begun. Francis showed himself friendly to Henry, and a meeting be-

tween them was prevented only by the latter's fear that a rebellion might break out during his absence. A French fleet guarded the channel through the summer. Henry's conduct was very energetic. Convocation declared that the pope had no more authority in England than any other bishop; convicted conspirators were executed; military preparations were made; the oaths of allegiance under the statute of succession were taken; and More and Fisher were imprisoned, and ultimately executed, for refusing to admit the king's supremacy. The act of supremacy was passed, making Henry the head of the church, which act has been described as "the epitome of all the measures which had been passed against the encroachments of the spiritual powers within and without the realm," and as being "at once the symbol of the independence of England, and the declaration that thenceforth the civil magistrate was supreme within the English dominions over church as well as state." A new and sweeping treason act was passed. The first fruits were transferred to the crown. The new pope, Paul III., who as Cardinal Farnese had been on Henry's side, showed a desire for reconciliation, and the French king labored in the same direction; but the hour for England's divorce from Rome had come, and all negotiation was now useless. The execution of Fisher and More created a great sensation among Catholics. The pope issued a bull of interdict and deposition against the king. The union of the Protestants was now more earnestly sought than before, Henry aiming at the formation of a grand league. The visitation of the monasteries commenced in 1535, and the first suppression took place the next year. Catharine died at the beginning of 1536, and the fall of Anne Boleyn occurred four months later, when Henry married Jane Seymour. On Anne's death new overtures came from Rome for a reconciliation, which failed principally through the indiscretion of Reginald Pole. The pilgrimage of grace occurred in 1536, being a popular outbreak, principally due to the suppression of the monasteries and to the social changes that were going on. The dispute was settled by compromise, the government yielding to some of the demands of the insurgents. A second outbreak was put down by force, and many persons were executed. Edward, prince of Wales, was born Oct. 12, 1537, and Queen Jane died 12 days later. During 1538 there were conspiracies against the crown, for which many persons suffered, at the head of whom stood the marquis of Exeter, a grandson of Edward IV. The final dissolution of the monasteries took place in 1539, the same year that the six articles were adopted, forming the new church in England, and embracing the real presence, communion in both kinds not necessary to salvation, forbidding the marriage of priests, upholding vows of chastity, declaring that private masses should be continued, and providing for

the continuance of auricular confession. This was followed by a persecution of the reformers. At the beginning of 1540 Henry married Anne of Cleves, a marriage that had been negotiated by Cromwell, with a view to uniting the Protestants of England and Germany; but the lady's unprepossessing appearance so disgusted the king that he soon procured a divorce, and in a few months Cromwell was sent to the scaffold. Henry took for his fifth wife Catharine Howard, niece of the duke of Norfolk, who was soon attainted and executed for adultery. He married a sixth time (1543), taking Catharine Parr, widow of Lord Latimer, who survived him. The countess of Salisbury, last of the Plantagenets, was executed in 1541. A war broke out between England and Scotland, in which the latter met with nothing but disgrace. England and the empire drew together again, and war was made by both with France. The emperor made peace with France in violation of his faith to England; but peace between England and France was not restored till 1546. In the mean time Henry continued to persecute both Catholics and reformers, and many persons suffered death. Internal reform, however, also went on, and among other changes worship was performed in English. Extreme men on both sides were offended by the king's course, who sought to trim between them. An act of parliament vested the properties of all hospitals, colleges, and chantries in the crown, but this was to prevent the resumption of such properties after the dissolution of the monasteries, and not as preliminary to confiscation. Toward the close of Henry's reign the conservatives obtained the ascendancy in his councils, and persecuted Protestants with considerable zeal, though Henry, in his very last speech to parliament (December, 1546), spoke as favorably of toleration as any statesman of that age could speak of it. Some of the worst deeds of his reign occurred at this time. Anne Askew was racked and burned, Latimer was arrested, and an attempt was made against the queen. Henry's interference put a stop to the last of these doings, and he was on the point of going as far forward in his work as Elizabeth afterward went, when his reign came to an end. The danger to which Protestantism was exposed in 1546, through the course of the emperor, alarmed him, and he suggested to the Germans an offensive and defensive league, to be called "the league Christian," of which he should be the head. He was ready to settle all minor differences with the Germans on religion, and to present a solid front to Rome. Home changes were to be made, the chief of which was the change of the mass into the modern communion. The Germans did not respond well to his offers, and were overthrown by the emperor. Henry was now very ill, being unable either to stand or to walk, and he prepared to settle the government that should exist during his son's minority. The Catholic party was then con-

spiring to get possession of all power, headed by the earl of Surrey, who was accused of treason, condemned, and executed a few days before Henry's death; and his father, the duke of Norfolk, was attainted by parliament, which met Jan. 14, 1547, and is supposed to have escaped the scaffold only because of the king's death, which happened at 1 o'clock on the morning of the 28th. As Henry's end approached he signified his wish to see Cranmer, who did not arrive until the king had become speechless. The archbishop spoke to him, and, asking him to give him some token that he put his faith in God through Jesus Christ, the king wrung his hand hard, and died. His will, which provided that daily masses should "be said perpetually while the world shall endure," at an altar to be erected near his tomb and that of Queen Jane, had been completed four weeks before his decease. He bequeathed the crown to his son and his issue, and, failing them, to such issue as he might have of his queen Catharine (Parr), or any other lawful wife whom he might marry. Failing such issue, it was to descend to Mary and her heirs, and then to Elizabeth and her heirs, provided they married not without the consent of their brother, or of the council appointed for his guardianship. Finally, and passing over the Scottish line, it was to go to the children of his sister Mary's two daughters. The government selected for Edward's minority was composed of men from both parties. Henry's reign has often been called a tyranny, but more than once he had to yield to the bold expression of the popular will. He was allowed to do as he pleased with the aristocracy, and he never encountered opposition when he glutted the scaffold with the noblest of victims. His reign was the seedtime of modern English parties, and its history has been written in a partisan spirit which has obscured it. James Anthony Froude is his ablest apologist. A collection of the papers of Henry VIII. was commenced by J. S. Brewer in 1862, of which seven volumes had been published in 1873.

II. FRANCE.

HENRY I., the third French king of the Capetian dynasty, born about 1011, died Aug. 4, 1060. As early as 1027 he was associated in the government by Robert, his father, whom he succeeded in 1031, notwithstanding the rebellion raised against him by his stepmother Constance. This he quelled through the assistance of Robert the Devil, duke of Normandy. Henry's weakness encouraged his vassals to rebel, and more than once he had to take the field against them; and toward the end of his reign he was even embroiled in a war with his former ally, the duke of Normandy. The hostilities were soon terminated by a treaty of peace, but were the beginning of the ill feeling which lasted so long between the kings of France and the English descendants of the dukes of Normandy. During his reign, France

was afflicted by a dreadful famine and by many private wars. The church attempted to allay the latter curse, by enforcing agreements known as the "peace of God" and "truce of God;" but Henry declined to abide by them. By Anna, daughter of Yaroslav, grand duke of Russia, he had Philip, who was his successor, and Hugh, who became count of Vermandois.

HENRY II., tenth king of the Valois family, born in St. Germain-en-Laye, March 31, 1519, died in Paris, July 10, 1559. The only surviving son of Francis I. by his queen Claude of France, he succeeded his father, March 31, 1547, adhering to whose policy, he engaged abroad in the great struggle to destroy the ascendancy of the house of Austria, while he persecuted the Protestants at home. Being entirely under the control of his mistress, Diana of Poitiers, who acted in concert with the great constable Montmorency and the brothers Guise, he had many of the Protestants arrested, tried, and burned at the stake in Paris, Lyons, Angers, Blois, and Bordeaux. By his edicts of Châteaubriant (1552) and Écouen (1553) the punishment of death was decreed for attendance at secret religious meetings. In 1557 ecclesiastics, under the title of inquisitors, were introduced into the parliaments to sit as judges in all cases against heretics. Finally, in 1559, two members of the parliament of Paris, Du Faur de Pibrac and Anne du Bourg, having been bold enough to advocate in his presence the liberty of conscience, were incarcerated, and Du Bourg was publicly hanged and burned. These bloody measures were the forerunners of religious wars. Henry's foreign policy was partially successful. The English, who were then in alliance with the emperor Charles V., were desirous of securing the union of Scotland by the marriage of young Edward VI. with Mary Stuart; French troops were sent to Scotland, and Mary was brought to France and affianced to the dauphin Francis. Meanwhile Boulogne was besieged, and England gave it up in 1550, for one third of the sum which had been stipulated for its surrender. In Italy, Henry protected Ottavio Farnese, duke of Parma, against the imperial troops; and in 1552 he became the ally of Maurice of Saxony and the other Protestant princes who were struggling to throw off the yoke of Charles V., and soon after seized the episcopal cities of Metz, Toul, and Verdun. Charles, having concluded the treaty of Passau with his German opponents, tried to reconquer those cities, and in 1553 made a fruitless attack upon Metz, which was defended by François de Guise, and avenged his defeat by pillaging Picardy, but was once more defeated at Renty in 1554. The French at the same time were successful in Italy, where Brissac conquered Savoy and Piedmont. Charles having abdicated in favor of his son Philip II., a five years' truce was signed at Vauxcelles in February, 1556. Henry II., however, soon renewed the war, but unsuccessfully; the duke

of Guise was foiled in his attempt against the kingdom of Naples by the superior ability of the duke of Alva, and the constable Montmorency was totally defeated near St. Quentin, in 1557, by Duke Philibert Emmanuel of Savoy. Had Philip II. improved the opportunity, Paris would have been taken; but his delay gave time to his rival to make preparations for defence; and Guise, being recalled from Italy, revenged the disgrace of Montmorency's defeat by the conquest of Calais in 1558, the only place that the English still possessed on French soil. But the Spanish troops under Egmont having won a new victory, Henry II., weary of war and yielding to the entreaties of his mistress, concluded, April 2, 1559, the disastrous peace of Cateau-Cambrésis. He kept Calais, Metz, Toul, and Verdun, but consented to restore all his conquests in Italy and the Netherlands, including nearly 200 strong places. Henry's daughter Elizabeth was to be married to Philip, and his sister Margaret to the duke of Savoy. During the celebration of the peace and the double marriage, Henry II. was mortally wounded in a tilt with the count de Montgomerie, the captain of his guards, and his sceptre passed to his eldest son, Francis II., the husband of Mary, queen of Scots.

HENRY III., the last king of the Valois family, born in Fontainebleau, Sept. 19, 1551, died Aug. 2, 1589. He was the third son of Henry II., and the favorite of his mother, Catharine de' Medici, and before his accession bore the title of duke of Anjou. Being placed at the head of the Catholic army in the reign of Charles IX., he won in 1569 the victories of Jarnac and Moncontour over the Protestants. He participated in the councils that brought about the St. Bartholomew massacre in 1572. His military reputation, aided by his mother's intrigues, procured his election to the throne of Poland in 1573; but his refined and effeminate habits were distasteful to the Poles, while he disliked their independent spirit and coarse manners. On hearing of the death of his brother Charles IX. in 1574, he secretly escaped and returned to France, passing through Vienna and Venice. His arrival was marked by the renewal of civil war. The Protestant party, being strengthened by their alliance with that party of Catholics known as the *politiques*, had taken up arms; but their German auxiliaries were defeated at Dormans, Oct. 11, 1575, by the duke of Guise; and the king, fearful of the growing popularity of that prince, hastened to conclude the peace of Beaulieu, in May, 1576, the terms of which were so favorable to the Protestants as to be considered a betrayal of the Catholic cause. This gave rise to the holy league, which, under pretence of protecting religion, aimed chiefly at furthering the ambitious designs of the house of Guise. Henry attempted to avert the danger by declaring himself chief of the league during the session of the states general which met at Blois in December, 1576; but the association clung faithfully to Guise as

their leader, and made use of their majority in the states to curtail the prerogatives of the king and force him into another war against the Protestants. After reluctantly carrying it on for a few months, he ended it by the treaty of Bergerac, Sept. 17, 1577, and tried by conciliatory measures to win over the most influential of the Catholics. This policy was of little avail; the so-called "lovers' war" broke out, which he succeeded in bringing to an early conclusion by the treaty of Fleix, Nov. 26, 1580. A momentary lull occurred; but the king became more and more unpopular by his unbounded licentiousness and prodigality. On the death of his younger brother, the duke of Alençon, by which the succession to the crown reverted to the Protestant Henry of Navarre, the spirit of the league rekindled; the association extended all over the provinces, and became more formidable than ever; the majority of the nation was indeed adverse to accepting as heir apparent a prince who was not a Catholic. Henry III., although not sharing this popular prejudice, was obliged to go to war with Henry of Navarre, and assembled four armies. By thus increasing its burdens he hoped to make the nation weary of the contest, while he exerted his ingenuity to make such combinations as would thwart the projects of the league. But his favorite Joyeuse was defeated by the king of Navarre at Coutras in 1587, and his own unpopularity increased, the league making him answerable for the reverses which befell the Catholic party. On all sides he was denounced as a traitor, and his deposition was publicly advocated. The duke of Guise was recalled to Paris by his adherents, and, notwithstanding repeated orders from the king, triumphantly entered the capital. Henry having summoned troops for his own defence, the Parisians raised a formidable rebellion; barricades were constructed, May 12, 1588; and the king barely escaped from his ambitious rival. He immediately convoked the states general at Blois, in the hope of finding support among them; but the majority was still against him; his life and crown were at stake; he resorted to violent means, and on Dec. 23, 1588, caused the duke of Guise to be murdered in his own apartment by his body guards, the "forty-five." This was a new incentive to the league. Henry, branded as an assassin, anathematized by the pope, deposed by decrees of the Sorbonne and the parliament, had no resource but to unite with Henry of Navarre, and they marched in concert against Paris, the principal seat of the league. During the siege of that city a Dominican monk, Jacques Clément, whose fanaticism had been encouraged by Guise's own sister, the duchess of Montpensier, presented himself at St. Cloud to the king as the bearer of an important letter, Aug. 1, 1589, and stabbed him with a knife, inflicting a wound of which he died on the following day. With Henry III. the Valois family became extinct.

HENRY IV., the first French king of the house of Bourbon, born at the castle of Pau, Dec. 14, 1553, assassinated in Paris, May 14, 1610. The son of Antoine de Bourbon and Jeanne d'Albret, queen of Navarre, he was brought up by his mother in the Protestant religion, carefully educated, and inured to hardship. As early as 1569 she took him to the Protestant army before La Rochelle, and placed him under the control of Admiral Coligni. He was present at the battles of Jarnac and Moncontour, both disastrous to his party. He distinguished himself in the military operations in southern France, which were terminated by the peace or edict of St. Germain in 1570. The seeming reconciliation of the Protestant and Catholic parties was to be sealed by the marriage of young Henry with Margaret, the sister of King Charles IX.; it was agreed to in April, 1572, and notwithstanding the sudden and unexpected death of Jeanne of Navarre, which occurred in June under very suspicious circumstances, the ceremony was performed on Aug. 17, seven days before the massacre of St. Bartholomew. A number of eminent Huguenots had congregated in Paris to participate in the matrimonial festivities, and were slaughtered during the bloody 24th. Henry himself, a prisoner in the Louvre, saved his life by abjuring his faith. For nearly four years he was detained at court, strictly watched, dissembling his real sentiments under the cover of levity. In February, 1576, he escaped, took refuge first in Alençon, then crossed the Loire at the head of a number of his adherents, revoked his abjuration, took command of the Protestant troops, and successfully carried on hostilities against the Catholics, which brought about the peace of Beaulieu in May, 1576. The states general at Blois having issued coercive decrees against the Huguenots, Henry took up arms again, but peace was concluded at Bergerac, Sept. 17, 1577. On the breaking out of the "lovers' war" in 1580, of which he gave the signal, he inspired his adherents with confidence and ardor, and accomplished deeds of heroic valor at the siege of Cahors, which city he stormed after a tremendous fight of four days' duration. He thus gained a high position, not only among his own party, but in the eyes of his opponents. The death of his mother in 1572 had left him king of Navarre; and on the death of the duke of Alençon, or rather Anjou, youngest brother of Henry III., June 10, 1584, he became heir apparent to the French crown. He was then in his 31st year. As he was deserted by Henry III., proscribed by the Catholic party and the league as a heretic, and shortly after excommunicated by Pope Sixtus V., his cause seemed desperate; but though his troops scarcely numbered one tenth as many as the Catholic army, he soon took the field with his wonted courage. The victory of Contras, Oct. 20, 1587, greatly bettered his fortunes, although it was followed by the defeat

of several auxiliary troops sent to him by the German princes. The *journée des barricades*, when Henry III. was compelled to leave his metropolis in the hands of the rebellious duke of Guise, brought about a reconciliation between the kings of France and Navarre, who united their forces to oppose the league, and in concert laid siege to the capital. The assassination of Henry III. greatly increased the difficulties of Henry of Navarre. He was at once deserted by the Catholic nobles who supported the cause of his predecessor, but who, notwithstanding their devotion to royalty, would not accept a Protestant king; the league at the same time raised against him his uncle, the cardinal de Bourbon, whom they proclaimed king under the title of Charles X.; and the nation itself evinced no partiality for Henry. He was obliged to raise the siege of Paris, was pursued through Normandy by the duke of Mayenne, and seemed to be in imminent danger, when he thwarted the hopes of his enemies by his heroic stand near the castle of Arques; notwithstanding their large superiority in numbers, they were obliged (Oct. 6, 1589) to beat a retreat, leaving from 1,000 to 1,200 men on the field. Henry, quickly returning to Paris, seized its suburbs, but could not take the city itself for want of artillery. Another and more decisive victory over Mayenne, that of Ivry, which he won March 14, 1590, once more opened before him the road to the capital, which he blockaded for several months, and had reduced to the last extremities, when it was relieved by the approach of a Spanish army under Alexander Farnese, duke of Parma. For two years longer the war was carried on with varied success, Henry being more than once worsted by his opponents, but, amid the most trying circumstances, showing such perseverance, ingenuity, and valor as to uphold the drooping spirits of his followers. A favorable change in his fortunes became apparent during the year 1593. Discord prevailed among his enemies; the ambitious designs of Philip II. of Spain, who openly manifested his desire of placing his daughter on the throne of France, inspired the French Catholics, and even the leaguers, with distrust and anger. A better feeling grew up among the people, who, being weary of so protracted a war, instinctively leaned toward the prince from whom alone peace could be expected. Everything showed him that the time had come for a decisive step; and he therefore abjured Protestantism at St. Denis in July, 1593, and was crowned at Chartres, Feb. 27, 1594. The majority of the nation at once sided with him. Paris surrendered March 22, and within a few months most of the Catholic governors of the provinces and cities also submitted. Mayenne still held Burgundy with the assistance of Spanish troops; but the high constable of Castile having been defeated at Fontaine-Française, June 5, 1595, negotiations were entered into, and the duke, swearing allegiance to Henry, kept the gover-

norship of the province. Picardy was meanwhile in the hands of Spain, against which war had been formally declared; the king led his army against Amiens, and, notwithstanding the presence of the Spanish army under the archduke Albert, forced that city to capitulate (1597), and the next year brought to submission the duke de Mercœur, who had heretofore acted as an independent sovereign in Brittany. France was now wholly under his control; he gave her peace at home by the celebrated edict of Nantes, April 13, 1598, and abroad by the treaty of Vervins with Spain, May 2. Henry now perseveringly pursued the policy of restoring order and prosperity to his kingdom, strengthening the royal authority, and placing France in a respectable position abroad. In this laborious task he was especially assisted by the duke de Sully. Agriculture, mining, commerce, and manufactures were encouraged; roads were opened and repaired; the army received a better organization, while strong fortresses were built along the N. and E. frontiers; the navy, which had been neglected, was improved, and attention was paid to the French colonies in America. In short, improvements were made in every branch of the public service. The ambitious aspirations of provincial governors were effectually checked; political conspiracies were severely punished; municipal franchises and immunities, that had been revived or extended during the civil wars, were curtailed; and obedience to the king became the order of the day. After the death of his celebrated mistress, Gabrielle d'Estrées, having procured the dissolution of his marriage with Margaret of Valois, December, 1599, Henry married Maria de' Medici, the niece of the grand duke of Tuscany, which secured his influence among the Italian princes. A short war with the duke of Savoy put him (1601) in possession of several valuable districts on the E. frontier. A formidable conspiracy having been plotted by the duke de Bouillon and the count d'Auvergne, in conjunction with Marshal Biron, who also maintained secret relations with Spain and Savoy, Henry had the latter, his old companion in arms, arrested, tried before the parliament, and beheaded, July 31, 1602. A few years later the count d'Auvergne, having engaged in new intrigues, was incarcerated in the Bastille; and the duke de Bouillon, the constant promoter of rebellions among the Protestants, was dispossessed of his principality of Sedan, and would have lost his life but for Queen Elizabeth's entreaties. His power being thus firmly established, Henry resumed the political designs of Francis I. and Henry II., concerted extensive schemes with Barneveldt, the grand pensionary of Holland, formed alliances with German Protestant princes, and made preparations for a fresh war against the house of Austria. It is even said that he aimed at nothing short of an entire reorganization of Europe. However this may have been, he was on the eve of leaving Paris

to take command of the French army in the north, when, riding through the city, May 14, 1610, he was stabbed to the heart by the fanatic François Ravallac. His death was regarded as a national calamity. Henry's children, by his second wife, were his successor Louis XIII.; Gaston, duke of Orleans; Elizabeth, who married Philip IV. of Spain; Christine, who became duchess of Savoy; and Henrietta Maria, the wife of Charles I. of England. César, his natural son by Gabrielle d'Estrées, was the founder of the house of Vendôme, and grandfather of the celebrated duke who distinguished himself under Louis XIV.—The high capacities of Henry IV., as well as his shortcomings and "amiable faults," have always been well known; but it is only in recent years that his ready wit and charming style as a writer have come to be fully appreciated, through the publication of his letters (9 vols. 4to) by M. Berger de Xivrey in the *Documents inédits sur l'histoire de France*. Motley's "Life and Death of John of Barneveld" (London, 1874) throws much light on Henry's last diplomatic transactions, and displays the occasional frivolity of his motives in his most important enterprises. See also *Henry IV.*, by M. H. de Lescure (Paris, 1874).

III. GERMANY.

HENRY I., king of Germany, surnamed the Fowler or Falconer (*der Finkler or Vogler*), the first of the line of Saxon sovereigns of Germany, born in 876, died in 936. He was the son of Otho the Illustrious, duke of Saxony, on whose death he succeeded to the dukedoms of Saxony and Thuringia. His father had been elected in 911 to the sovereignty of Germany, but had caused Conrad, duke of the Franks, to be elevated in his stead. This sovereign undertook to deprive Duke Henry of part of his inherited estates, but the latter fought his enemy at Eresburg (modern Stadtberge), and compelled him to acknowledge all the ducal rights of Saxony and Thuringia. Conrad discovered the great qualities of his opponent, and, having been mortally wounded in an expedition against the Hungarians, designated Henry as his successor, and sent messengers to make known his choice. The envoys, it is said, found the duke in the Hartz mountains, with a falcon upon his wrist, and this was the origin of his surname. Henry's election was formally declared in 919, by the nobles of Franconia and Saxony. The dukes of Swabia and Bavaria refused their homage, but were speedily brought to submission. Henry also conquered Lorraine, which had hesitated to accept him. He erected the fief into a duchy, giving his daughter in marriage to Duke Gisibert; and having thus consolidated the sovereignty of Germany, he turned all his attention to arresting the Slavic and Hungarian inroads. In 924 the Hungarians advanced into the very heart of Saxony. Their leader was captured, and in exchange for him Henry

obtained a truce of nine years. He made the most of the truce by organizing his army, building castles, fortifying cities, and reducing Brandenburg, together with the tribes on the Eider and the Elbe, and extending his rule to Prague. From this period dates the fealty of the Bohemian princes to Germany (929). On the expiration of the truce war with the Hungarians was renewed, and Henry gained a complete and decisive victory on the banks of the Saale (933), which for the time relieved Germany from all danger of invasion. In 934 he defeated the Danes, who were ravaging the coasts of his northern provinces. Henry reigned nearly 18 years, and left his kingdom powerful and prosperous. The municipal privileges which he granted were the foundation of the Germanic corporations.

HENRY II., *Salut*, surnamed the Lame, emperor of Germany, great-grandson of the preceding, born May 6, 972, died at Grone, near Göttingen, July 13, 1024. His surname of the Lame was derived from an accident which befell him at Pavia in 1004. He succeeded his father as duke of Bavaria in 995, was elected successor to Otho III. at Mentz, June 6, 1002, and marched immediately against Hermann of Swabia, his competitor, whom he defeated. After ravaging Swabia, Thuringia, Saxony, and Lorraine, he had himself crowned a second time at Aix-la-Chapelle; he married Cunegunda (Kunigunde), daughter of Sigfried, first count of Luxemburg, and had her crowned at Paderborn in 1003. In the following year he passed into Italy, defeated Arduin of Ivrea, who had assumed the title of Cæsar, and on May 15 was crowned in Pavia with the iron crown of the Lombard kings. Returning to Germany, he drove the Poles out of Bohemia in 1006, confirmed Stephen of Hungary in his new royal dignity in 1007, and in 1008 bestowed the duchy of Lorraine upon Godfrey, count of Ardennes. The continued ill success of his arms against Boleslas of Poland inspired him in 1011 with the resolution to embrace a monastic life; but his counsellors dissuaded him from his purpose, and he soon afterward concluded a peace with Poland and secured the frontiers of Bohemia. At this time Cunegunda, being publicly accused of adultery, underwent the ordeal of walking on red-hot ploughshares. In 1013 Henry defeated Arduin a second time, and having restored Pope Benedict VIII., he and Cunegunda received at his hands the imperial crown at Rome, Feb. 14, 1014. Historians accuse him of having on this occasion promised fealty to the pope, thereby sowing the seeds of future dissensions between church and state. Having pacified Lombardy, Henry returned to Germany, and on his way assumed the monastic habit in the convent of St. Vannes at Verdun, and vowed obedience to the abbot. But the latter forthwith commanded him to resume his imperial state and attend to the government of the empire. He was defeated anew by the Poles in 1015, and

the war with them continued till 1018. Henry was about retiring to the cloister, when at the solicitation of the pope in 1021 he returned to Italy to repel the Saracens. In 1022 he presided at the council of Seligenstadt, and in 1023, at an interview with the king of France near Sedan, he concluded an advantageous peace. He was buried in the cathedral of Bamberg founded by himself, and with him ended the imperial Saxon line. He founded many monasteries and schools, which became centres of learning. He was canonized by Eugenius III. in 1152, and his feast is celebrated on July 14. Cunegunda was also canonized in 1201. Henry's life, written probably by Adebald, bishop of Utrecht, was inserted with the annotations of Basnage in the *Thesaurus Monumentorum Ecclesiasticorum* of Canisius (Antwerp, 1725), and is reproduced in the *Acta Sanctorum* for July.

HENRY III., emperor of Germany, of the Franconian line, surnamed the Black, the Bearded, the Old, and the Pious, born in 1017, died in 1056. He was the son and successor of the emperor Conrad II., having been elected during his father's life, and ascended the throne in 1039. He repeatedly and successfully interfered in the affairs of Hungary, and a portion of that country (from the Kahlenberg to the Leitha) was definitively united with Austria. Three claimants at this time were contesting the papal tiara. Henry summoned a council at Sutri in 1046, set them all aside, and created a German bishop of Bamberg (Suidger) pope, under the title of Clement II. He subsequently gave three successive German popes to Rome, reserving to himself a thorough control of the spiritual administration. He held the temporal princes at the same time in subjection, transforming the German empire into a monarchy of which the elected sovereign was absolute ruler. He promoted education, and encouraged art and science. His first wife was a daughter of Canute, king of Denmark and England.

HENRY IV., emperor of Germany, son of the preceding, born in 1050, died in Liège, Aug. 7, 1106. He was about six years old when his father died, and the regency was intrusted to his mother, Agnes of Aquitaine; but her authority was overthrown by the nobles, and she retired to Rome, while Henry was taken to Cologne by the archbishop Hanno. Shortly afterward he became the pupil and ward of Archbishop Adalbert of Bremen, from whom he imbibed a feeling of hostility against the temporal lords, especially those of Saxon descent, which embittered his whole reign. At 15 he was declared of age, and in the following year (1066) was removed by the nobles from the immediate control of Adalbert. The counsel and instructions of the archbishop, however, were never forgotten, and Henry soon manifested a hatred of the Saxons by acts of oppression and violence. He had espoused Bertha, the daughter of an Italian prince of Susa, and now sought

to be divorced from her. The pope manifested opposition, and Henry, after vainly resorting to unworthy means for the accomplishment of his wishes, at length became reconciled to his young wife, whose noble conduct subsequently won and retained his affection. Meanwhile the exasperated nobles of Saxony rose against the emperor, who was driven from several strongholds in succession, and finally wandered three days in the Hartz without food. Under the guidance of a mountaineer he escaped to the Rhine, assembled an army, defeated the Saxons, and desolated their country with fire and sword. Other princes of the empire now interfered, and the Saxon nobles, after public humiliation upon their knees, were admitted to mercy, though many of them were retained as prisoners, and their fiefs made over to other vassals. Henry rebuilt his Saxon fortresses, and by his arrogance and extortion planted anew the seeds of revolt. Meanwhile he was suddenly commanded by Pope Gregory VII. (Hildebrand) to appear at Rome to answer for crimes laid to his charge, on penalty of excommunication. Henry's indignation vented itself for the moment in a missive addressed to the "false monk Hildebrand," informing him of his deposition by the German prelates (Worms, 1076), and of his excommunication by judgment of the same assembly. The pope immediately issued sentence of excommunication. Henry soon learned the necessity of submission. Deserted and threatened by the majority of the German princes, he hastened to Italy, accompanied by his wife and a single attendant, and humbled himself before the pope in the most penitential manner. Clad in a shirt of hair, and barefooted, he was compelled, it is said, to pass three whole days in an outer court of the castle of Canossa, in midwinter, awaiting Gregory's permission to appear before him. On the fourth day he was admitted and received absolution. With this, after finding adherents among the Lombards, his courage and resentment alike revived. He began a war with the sword and with the pen, which for 30 years he sustained with the greatest skill and determination, and in which for the most part he maintained the ascendancy. Such were the opening scenes of the long and violent contest concerning investitures—a conflict between state and church which was destined to rage for half a century, and which, subsequently resumed, was protracted till 1268. During Henry's absence the German princes had deposed him, and elected Rudolph of Swabia, in a diet at Forchheim (March, 1077); but there were yet cities and bishoprics in Germany which remained faithful, and Rudolph was forced to retire from Swabia, which duchy, together with the hand of his daughter Agnes, Henry bestowed upon a bold adherent, Count Frederick of Bären, who soon built his castle on the summit of Mt. Staufen, and founded the race of Hohenstaufen. The war raged fiercely meanwhile in the fairest regions of Germany. The pope, who was

not sorry to find the rival emperors consuming their strength against each other, is supposed to have fostered the quarrel for his own purposes. At length, influenced by the Saxons, he sent the crown to Rudolph, and again excommunicated Henry. The latter, in turn, again declared the pope deposed, and caused an antipope, Clement III., to be elected. At this period (1079) fortune appeared to favor Henry; but in the following year he lost a great battle near Gera. In the action, however, Rudolph was slain by Godfrey of Bouillon, the hero of the first crusade. The fall of Rudolph, although his army was victorious, was considered a judgment of God, and the effect was to enlist an immense increase of numbers in the service of Henry, who now marched upon Rome, and besieged it with short intervals during three years. Gregory retreated into the castle of Sant' Angelo, and Henry contented himself with a coronation by his own pope, Clement (1084). Robert Guiscard, the Norman duke of Calabria, at length approached from lower Italy, and Henry retired, leaving Rome to be plundered by the Normans, and Gregory to be rescued by them from his own people, who had laid siege to the castle. Hermann of Luxemburg succeeded Rudolph in the rival emperorship, and Victor succeeded Gregory in the rival papacy (1085); but neither could withstand the power of Henry. Hermann soon abdicated, and his successor, Egbert of Thuringia, having been assassinated, the Saxons submitted. Henry's eldest son, Conrad, whom he had named king of the Romans, was now gained over by the papal party. He was deposed, and died in 1101. His defection was followed by that of his brother Henry, who, in view of the renewal of the papal ban against his father by the popes who had in turn succeeded Victor, resolved to support the church. He pretended a reconciliation, however, and the emperor, having been treacherously seized and carried prisoner to Ingelheim, was compelled by the prince to resign his throne. Henry escaped, and sought refuge at Liège, where he died.

HENRY V., emperor of Germany, surnamed the Young, second son of the preceding, born in 1081, died in Utrecht, May 23, 1125. His filial ingratitude and treachery are noticed in the account of Henry IV., whom he succeeded in 1106. Notwithstanding his revolt against his father, he acted from the outset of his reign according to the principles of the late emperor, and in defiance of the pope he claimed the right of investiture. He espoused Matilda, daughter of Henry I. of England, and was enabled by her dowry to go to Italy with great magnificence and a strong military force, to be crowned by the pope. The pontiff, Paschal II., had made propositions of compromise in regard to the dispute concerning investitures, and the subject was to be adjusted in solemn assembly in the church of St. Peter; where, however, an angry discussion among the bishops was followed by the seizure and imprisonment of the pope

and cardinals. Henry's army, encamped around the church, was attacked by the enraged Romans, and in a furious battle the emperor's life was with difficulty saved by Count Otho of Milan, at the expense of his own. The Romans were driven into the city, and after Henry had ravaged the surrounding country, the pope purchased his own liberty and the safety of the city by consenting solemnly to the imperial right of investiture, declaring at the same time that Henry should not be excommunicated. The latter clause was incorporated in the treaty, and the emperor was crowned in St. Peter's, April 13, 1111. But scarcely had he taken his departure, when Paschal denounced the treaty as having been extorted by force. The dispute, thus renewed, was protracted with great animosity for ten years. Henry was excommunicated by the successors of Paschal, and defeated in northern Germany, where the princes refused obedience. In Saxony also the emperor lost all authority. In 1116 he led a second expedition against Rome, created an antipope, Gregory VIII., but at length saw the necessity of abandoning his claim, and subscribed the famous concordat of Worms (1122), by which he surrendered the investiture with ring and crozier as tokens of spiritual jurisdiction, and agreed to permit the free choice of the German bishops, whose election, however, was to take place in presence of the emperor or of his plenipotentiary. It was also agreed that in doubtful elections, or in electoral disagreements, the decision should lie with the emperor, whose imperial authority, in connection with the temporal possessions of the churchmen, was at the same time solemnly acknowledged. The concordat, virtually a compromise, was received throughout Europe with great joy, and the remainder of Henry's reign was passed in peace with the church; but dissensions prevailed throughout his dominions. He formed plans for strengthening the imperial power, and began a war with France, but was cut off suddenly by a contagious disease. With him ended the race of Salian or Franconian princes. His hereditary possessions fell to the sons of his sister Agnes, Frederick and Conrad of Hohenstaufen; and the imperial crown was conferred upon Lothaire of Saxony.

HENRY VI., surnamed the Cruel, emperor of Germany, son and successor of Frederick I. (Barbarossa), born in 1165, died in Sicily, Sept. 28, 1197. He had been crowned king by the Lombards in 1185, and was also during his father's lifetime named successor to the imperial throne. In 1186 he married the Norman heiress, Constance of Naples and Sicily. On the death of Frederick in Cilicia (1190), Henry, who had been invested with the government during his father's absence, succeeded without opposition. But the return from England of Henry the Lion of Saxony, who had been temporarily exiled by Frederick, provoked new wars, which were terminated by the marriage of the son of the duke with Agnes, prin-

cess palatine, cousin to Henry. In 1192 Richard Cœur de Lion was arrested while going through Germany in disguise, and with his ransom Henry fitted out an expedition to Italy. Naples surrendered, and he was crowned at Palermo in October, 1194; but his cruelty to the Italian nobles who had rebelled, and his extortion, rendered him so odious that his sudden death is generally attributed to poison. Constance has been accused of the murder. At the time of his death he was preparing for an expedition against the Greek empire, preliminary to a new crusade.

HENRY VII., of Luxemburg, emperor of Germany, born in 1262, died at Buonconvento, near Siena, Aug. 24, 1313. He was elected emperor in 1308, after an interregnum of four months which followed the death of Albert I. After punishing the murderers of his predecessor, and after the marriage of his son John with the heiress of Bohemia, he went to Italy, which was distracted by the wars of the Guelphs and Ghibellines; and having compelled the Milanese to consent to his coronation with the iron crown of Lombardy, he reduced the whole of northern Italy, and continued his march to Rome, of which King Robert of Naples held military possession. After the reduction of that city, and the imperial coronation by cardinals (the pope, Clement V., having transferred the holy see to Avignon in 1309), Henry placed Robert under the ban of the empire, and was about to march against Naples when he died suddenly, of poison, it was affirmed, administered in the eucharist.

HENRY, Caleb Sprague, an American author, born in Rutland, Mass., Aug. 2, 1804. He graduated at Dartmouth college in 1825, and, after a theological course at Andover and New Haven, settled in 1828 as a Congregationalist minister at Greenfield, Mass. In 1831 ill health obliged him to suspend his ministry, and he spent two years at Cambridge in the study of philosophy. In 1833 he was settled in Hartford, Conn. In 1834 he published a pamphlet on the "Principles and Prospects of the Friends of Peace." About this time he also established a journal called the "American Advocate of Peace," which after the first year became the organ of the American peace society. In 1835 he removed to New York, where he took orders in the Protestant Episcopal church. Soon afterward he was appointed professor of intellectual and moral philosophy in Bristol college, Pa. In 1837 he returned to New York, and in conjunction with Dr. Hawks founded the "New York Review." In 1839 he became professor of philosophy and history in the New York university. He published in 1845 a translation of the abbé Bautain's "Epitome of the History of Philosophy," with a continuation from the time of Reid down to the date of its publication. He has also published "Cousin's Psychology," being a translation of Cousin's lectures on Locke's "Essay on the Human Un-

derstanding," with notes and additional pieces (Hartford, 1834; 4th ed., revised and enlarged, 1856). In 1847 he became rector of St. Clement's church, New York. On account of failing health he resigned this post in 1850, and his professorship in 1852. In 1870 he took charge of St. Michael's church, Litchfield, Conn., where he continued for four years, when he removed to Stamford, where he now resides (1874). Dr. Henry has published, besides the works above mentioned, "Compendium of Christian Antiquities" (8vo, 1837); "Moral and Philosophical Essays" (1839); "Guizot's General History of Civilization, with Notes;" "Household Liturgy;" Taylor's "Manual of Ancient and Modern History," revised, with a chapter on the history of the United States (New York, 1845); "Dr. Oldham at Greystones, and his Talk there" (1860; 3d ed., 1872); "Considerations on some of the Elements and Conditions of Social Welfare and Human Progress," and "About Men and Things: Papers from my Library Table Drawer" (1873); and numerous addresses and pamphlets.

HENRY, Joseph, an American physicist, born in Albany, N. Y., Dec. 17, 1797. He received a common school education, and after a course of study in the Albany academy, in 1826 he was appointed professor of mathematics in that institution. In 1827 he began a series of experiments in electricity, and in 1828 published an account of various modifications of electro-magnetic apparatus. He was the first to prove by actual experiment that in the transmission of electricity for great distances the power of the battery must be proportioned to the length of the conductor. He was also the first actually to magnetize a piece of iron at a distance, and invented the first machine moved by the agency of electro-magnetism. (See ELECTRO-MAGNETISM.) In March, 1829, he exhibited to the Albany institute electro-magnets which possessed magnetic power superior to that of any before known, and subsequently he constructed others on the same plan, one of which, now in the cabinet of the college at Princeton, N. J., will sustain 3,600 pounds, with a battery occupying about a cubic foot of space. In 1831, in some experiments at the Albany academy, he transmitted signals by means of the electro-magnet through a wire more than a mile long, causing a bell to sound at the further end of the wire. An account of these experiments and of his electro-magnetic machine was published in Silliman's "American Journal of Science" in 1831, vol. xix., in which Prof. Henry pointed out the applicability of the facts demonstrated by his experiments to the instantaneous conveyance of intelligence between distant points by means of a magnetic telegraph, several years before such a telegraph was brought into practical operation by Prof. Morse. In 1832 he was appointed professor of natural philosophy in the college of New Jersey at Princeton, where he continued his experiments and researches.

In his first course of lectures in that institution in 1833 he mentioned the project of the electro-magnetic telegraph, and demonstrated that the electro-magnet might be used to produce mechanical effects at a distance. In February, 1837, he went to Europe, and in April of that year visited Prof. Wheatstone of King's college, London, to whom he explained his discoveries and his method of producing great mechanical effects at a distance, such as the ringing of church bells 100 miles off, by means of the electro-magnet. In 1846, on the organization of the Smithsonian institution at Washington, Prof. Henry was appointed its secretary, a post which he still holds (1874), and which gives him the principal direction of the institution. His discoveries in physics are numerous, some of the most important of which are described in various scientific articles in this work. He is the author of "Contributions to Electricity and Magnetism" (4to, Philadelphia, 1839), and many papers in the "American Philosophical Transactions," in Silliman's "Journal," in the "Journal of the Franklin Institute," and in other scientific periodicals.

HENRY, Matthew, an English Biblical commentator, son of Philip Henry, born at Broad Oak, Flintshire, Oct. 18, 1662, died in Nantwich, June 22, 1714. He studied law for some time, but preferred the ministry, succeeded as a preacher, and was soon invited to Chester, where, being ordained in 1687, he drew around him a large congregation, to which he ministered for 25 years. During this period he more than once went through the entire Bible in a course of expository lectures, which he continued at Hackney, whither he removed in 1712. He thus gradually completed his celebrated "Exposition" of the Bible. The first collective edition was published in 1710 (5 vols. fol., London), and it has been many times reprinted. Henry's other works include "Life and Death of Rev. Philip Henry" (1698); "Method of Prayer" (1710); "Treatise on Baptism;" "Communicant's Companion" (1731). A collection of his miscellaneous works, in one volume, appeared in London in 1830. See "Life of Matthew Henry," by W. Tong (1716), and also by Williams prefixed to the "Exposition" (3 vols., London, 1828).

HENRY, Patrick, an American orator and statesman, born at Studley, Hanover co., Va., May 29, 1736, died at Red Hill, Charlotte co., June 6, 1799. His father, John Henry, was a native of Aberdeen, Scotland, and a nephew of Robertson the historian. His mother was first married to Col. John Syme, and afterward to John Henry, who was colonel of a regiment, county surveyor, presiding magistrate, and a man of liberal education and conspicuous loyalty. A few years after the birth of the boy, Col. John Henry removed from Studley to Mount Brilliant in the same county, where the childhood and early youth of the future orator were passed. He was sent first to an "old field school," where at that period tuition was

chiefly confined to the English and primary departments, with perhaps a smattering of the classics. Under his father, who taught a grammar school in his own house, he acquired a competent English education, and some acquaintance with Latin and mathematics. But hunting and angling early grew to be passions with him; he would desert his books at any moment to seek the forest with his gun, or the neighboring streams with his fishing rod. At the age of 14 he heard the celebrated Presbyterian preacher Samuel Davies, whose eloquence produced a powerful effect upon the boy and opened a new world for him. Henry spoke of him throughout life in terms of unbounded admiration, and declared that any success which he himself had achieved was due in a large measure to the great orator of the Presbyterian church. About this time his father became embarrassed, and required assistance from his sons. Patrick was accordingly placed behind the counter of a country merchant, and the year after, at the age of 16, his father set him up in business with his elder brother William. The future orator possessed none of the traits which secure success in trade. He was indolent, careless, slovenly in his dress, and awkward in manners, but humorous and attractive in conversation; and his fondness for social pleasures was rather an obstacle than an advantage. William Henry was even less energetic than his brother, and, after a year's experience, abandoned the business. After this Patrick became still more indolent. His social and sporting propensities grew upon him. The hunter's horn and the cry of the hounds often drew him away; and he expended on the violin and the flute the energies which should have been given to his business. At other times he gratified the dry humor which characterized him by exciting debates among the country people who hung around the store. He would relate stories, real or fictitious, and derive his own amusement from the emotions exhibited by the simple auditors. If to these idle pursuits be added the fact that he could not refuse any one credit, the result of the mercantile venture may without difficulty be understood. In two or three years the store was closed, and Patrick Henry was insolvent. He had just married Miss Shelton, the daughter of a respectable farmer. With the assistance of his father and father-in-law he began farming upon a small scale, but in two years abandoned it in despair, and selling his scant property turned again to merchandise. But experience and misfortune had taught him nothing. The violin, the flute, his old pastime of telling stories and watching the expression of his auditors, were cultivated with renewed ardor. He studied geography, read translations of Latin and Greek authors, Livy being his favorite, and, when weary of books, shut up his store, and went hunting or fishing. The former result duly followed. He again became bankrupt, and began to study law. At the age of

24, after only six weeks' study, he presented himself before the judges, who granted him a license with hesitation, and only after a promise to study further before commencing practice. It is said that at this time he was unable to draw a declaration, or perform the simplest duties of his profession. He could obtain no practice, and the distress of his family was extreme. He was living with his father-in-law, who then kept the tavern at Hanover Court House, and Henry assisted him in the business, filling the place of Mr. Shelton in the tavern when he was compelled to be absent. Otherwise he was as idle as ever. But events were rapidly hastening toward the commencement of the great political struggle in which he was to bear so glorious a part. His first appearance in public, as in every great movement of his career, was on the side of popular rights. At the age of 27 he was retained, for want of a better advocate, in what seemed a desperate struggle—the celebrated “parsons’ cause,” the history of which was briefly as follows. In 1755, a year of great drought, and serious public embarrassment from the expenses of the French war, the house of burgesses had enacted that all debts due in tobacco, then a species of currency, should be paid either in kind or in money, at the rate of 16s. 8d. for the 100 lbs. of tobacco, or 2d. per pound. The law was universal in its application, and was to remain in force for ten months. Its effect was to reduce all fees and salaries to a moderate amount in money, and it bore especially upon the clergy of the established church. They were entitled by law to 16,000 lbs. of tobacco per annum each, and the act deprived them of about 66 per cent. of their due. There was much dissatisfaction, but no resistance. When, however, in 1758, a similar law was passed, an acrimonious controversy arose between the planters and the clergy. The latter appealed finally to the king in council, and the act was declared void. Suits were immediately instituted by the clergy in the different counties to recover the amount of loss which they had suffered by the “twopenny act.” The county of Hanover was selected as the theatre of the struggle, the decision in one case being regarded as a fair test of the question. The court, on demurrer, decided in favor of the plaintiff, the Rev. John Maury; and the case now stood upon a common writ of inquiry of damages. The contest was considered at an end, and Patrick Henry seems to have been employed by the defendants merely as a matter of form. They had calculated without the popular feeling against the clergy, who were hated by a great part of the people. A large crowd assembled to witness the trial of the question of damages. On the bench sat more than twenty of the clergy, among them many of the most learned men in the colony. Their case was lucidly and calmly stated by Peter Lyons, a distinguished counsellor of the time; and Patrick Henry rose to reply. The array before him was terrifying to

a youthful and inexperienced man, and the presence of his father in the chair of the presiding magistrate did not lessen the embarrassment of his position. His exordium was awkward and confused. He visibly faltered. The crowd, whose sympathies were all on the side which he represented, hung their heads and gave up the contest. The clergy smiled and exchanged glances of triumph. The father of the speaker almost sank back in his seat. But a change suddenly took place in the demeanor of every one. All eyes were drawn to the youthful orator. His confusion had passed away; his form rose erect; and the “mysterious and almost supernatural transformation of appearance” which his contemporaries spoke of passed over him. Those who heard the unknown young man in this his first speech said that he “made their blood run cold and their hair to rise on end.” Under his terrible invective the clergy disappeared hastily from the bench; and the jury, after retiring for an instant, brought in a verdict of one penny damages. A motion was made by Mr. Lyons for a new trial, but it was overruled; and Patrick Henry, thenceforth the “man of the people,” was caught up by the crowd, drawn out of the court house, and borne on the shoulders of the multitude. Thus, at a single step, Henry rose to the first rank among the Virginia orators of the time. His success in the parsons’ cause brought him profit as well as fame. He no longer suffered from want of business, and seems to have addressed himself to the prosecution of his profession with industry and energy. The law was not, however, destined to monopolize his genius. He entered the house of burgesses in the spring of 1765, at the moment when England consummated her long series of oppressions upon the American colonies by the passage of the stamp act. The bill received the royal sanction in March of that year, and in May it came up for discussion before the burgesses. The character of that body was anomalous—its action difficult to predict. It had opposed consistently and with stubbornness all encroachments of the home government from the earliest times; it had repeatedly denied the right of the English parliament to lay imposts upon the American colonies, and had systematically contended that taxation and representation were inseparable. But peculiar elements and considerations entered into the struggle about to take place. An open rupture with England was extremely repugnant to the dominant party in the house. The great majority of the burgesses were opulent planters of the tide-water region, attached to the mother country by a thousand ties. They regarded Magna Charta, the established church, and the common law as a part of their inheritance; and a dissolution of the ties which bound them to Great Britain seemed a relinquishment of the part which they had in these great institutions. Thus socially and politically the ruling classes in Virginia were opposed to extreme measures,

and in the house which assembled in the spring of 1765 they were represented by their most powerful names. These gentlemen held back, hesitated, and advocated renewed protests and petitions. It was in the midst of this general indecision and doubt that Patrick Henry startled the assembly by his celebrated resolutions. He was almost unknown to the members, and the first sentiment of the richly clad planters was scorn and indignation at the presumption of the slovenly and awkward youth, in leather knee breeches and a homespun coat, who ventured to assume the post of leader in an assemblage so august and at a moment so critical. His resolutions, which he had hastily written on the leaf of a law book, contained none of the old formal and submissive phrases. They suggested no new petition or protest. They declared that the house of burgesses and the executive had "the exclusive right and power to lay taxes and imposts upon the inhabitants of this colony;" and that, consequently, the stamp act, and all other acts of parliament affecting the rights of the American colonies, were unconstitutional and void. The best patriots received the resolutions with a tempest of opposition. They were declared extreme, impolitic, and dangerous. "Many threats were uttered," says Henry, "and much abuse cast on me by the parties for submission." Thomas Jefferson, who heard the debate, says that it was "most bloody." But the nerve and resolution of the young burgesses were as great as his eloquence. In the midst of the debate he thundered: "Cæsar had his Brutus, Charles the First his Cromwell, and George the Third—" "Treason!" cried the speaker, "Treason, treason!" echoed from every part of the house—"may profit by their example! If this be treason, make the most of it!" The resolutions, in spite of a bitter opposition, were carried, the last by a majority of one. The young man had thus achieved at the age of 29 the reputation of being the greatest orator and political thinker of a land abounding with public speakers and statesmen. He had suddenly become a "power in the state;" and the sceptre, departing from the hands of the wealthy planters, was wielded by the county court lawyer. The mouthpiece of resistance, the authoritative representative of the masses as distinguished from the aristocracy, and soon to be the advocate of revolution, Patrick Henry thenceforth occupied a post of strength from which his enemies were unable to drive him. From the pursuits of his profession, to which he returned, he was soon again recalled to the stage of public events. The stamp act had been repealed, but the policy of laying burdens upon the colonies had not been abandoned. In 1767 the act levying duties upon tea, glass, paper, and other articles, threw the country into renewed ferment. In the spring session of 1769 the leading advocates of resistance in the house of burgesses, of whom Patrick Henry, Thomas Jefferson, and the

Lees were the most active and determined, offered a series of resolutions which caused the dissolution of the body by Lord Botetourt. Henry and his friends immediately assembled at the old Raleigh tavern in Williamsburg, and drew up articles of association against the use of British merchandise, which were generally signed by the burgesses. Here terminated for a time the struggle, and Henry returned to his profession, though he continued a member of the burgesses. In this year he was admitted to the bar of the general court, where his appearance was respectable, but not distinguished. He was not a good "case lawyer," from defective study; but in jury trials, where his wonderful powers of oratory could be brought to bear upon the passions of men, he excelled all his contemporaries. For four years Henry continued to occupy a seat in the house of burgesses, and to practise his profession. Then the struggle between Great Britain and the colonies commenced in earnest. It was plain that both sides were greatly embittered, and there is evidence that Patrick Henry, Thomas Jefferson, and other advocates of uncompromising resistance desired to take advantage of the public sentiment and precipitate the rupture. Early in the session of 1773, Henry, Jefferson, the two Lees, and Dabney Carr met in the Raleigh tavern and originated that great machine, the "committee of correspondence, for the dissemination of intelligence between the colonies." The burgesses promptly acted upon the suggestion, and were as promptly dissolved by Lord Dunmore, who had succeeded Botetourt. They were all reelected by the people, and resumed their seats in the spring of 1774. Massachusetts had already made her courageous stand against parliament. The tea of the East India company had been thrown overboard in Boston harbor, and a collision between England and the colonies was now in the highest degree probable. The most determined patriots were therefore summoned to the public councils in Virginia. The Boston port bill, closing Boston harbor on June 1, speedily arrived. The leaders of the burgesses again met in secret consultation, and the result was a resolution that the 1st of June should be set apart as "a day of fasting, humiliation, and prayer" throughout the province. The burgesses passed the resolution, and Dunmore duly dissolved them. They retired to the Raleigh tavern as before (May, 1774); but public feeling was too deeply aroused to content itself with protests or "articles of association." The meeting resulted in two resolves of the utmost importance. The first was that the different counties should be recommended to elect deputies to assemble at Williamsburg, Aug. 1, to consult for the good of the colony. The second was that the committee of correspondence should propose immediately to all the colonies a general congress, to meet annually and deliberate upon the common welfare; "the first recommendation of a general congress,"

says Irving, "by any public assembly." The deputies accordingly assembled on Aug. 1, subscribed a new and more thorough non-importation agreement, and appointed delegates to a general congress, to meet at Philadelphia in September. Among these delegates was Patrick Henry, and his voice was the first to break the silence of the august assembly. His fame had preceded him. He was recognized and greeted as the great champion of constitutional liberty—the man who, more than any other, had aroused public sentiment in, and directed the councils of, the great province of Virginia. His extraordinary eloquence astonished all listeners. It was "Shakespeare and Garrick combined." When he took his seat, there was no longer a doubt in any mind that he was the greatest orator of America, and one of the greatest of any land or age. A petition to the king, and an address and memorial to the inhabitants of Great Britain, were the chief results of the congress, which adjourned in October. Henry returned home with his brother delegates, and, when asked who was "the greatest man in congress," replied that Mr. Rutledge of South Carolina was the greatest orator, but Col. George Washington the greatest man—an instance of his powers of penetrating into the depths of human character. With the spring of the next year, 1775, all things advanced rapidly toward the dividing line between peace and war. In March the second convention met in Richmond, and here again Henry assumed a position very far in advance of his associates. He rose and moved that the militia should be organized, and the "colony be immediately put in a state of defence." The resolutions met with strong opposition, as had been the case with his stamp act resolutions ten years before in the house of burgesses. The leading and greatest patriots warmly opposed them as precipitate and ill advised. Henry's speech in reply was one of extraordinary eloquence and power. With the vision of a prophet almost, he exclaimed: "There is no retreat but in submission and slavery. Our chains are forged! Their clanking may be heard on the plains of Boston. . . . The next gale that sweeps from the north will bring to our ears the clash of resounding arms. . . . I know not what course others may take; but as for me—give me liberty or give me death!" The resolutions were passed without a dissenting voice, and the convention rose. Ere long arrived the news of the battles of Lexington and Concord. The contest was not to be long delayed on the soil of Virginia. In compliance with general orders from England, Lord Dunmore had on the night of April 20 removed clandestinely from the magazine in Williamsburg all the powder of the colony. The alarm spread rapidly throughout the province, and the people flew to arms. Seven hundred men assembled at Fredericksburg, but, receiving an assurance that the powder would be restored, were disbanded. Patrick Henry

saw the favorable moment thus about to pass. He determined to act boldly. Summoning the militia of Hanover, he placed himself at their head, despatched a troop to arrest the king's receiver general, and marched upon Williamsburg. Lord Dunmore's agent met him on the way, and paid £330 for the powder; and on his return home Henry found himself and his friends denounced in a public proclamation as "deluded" arousers of sedition. But the whole province, indeed all the land, was equally deluded. The defiance had been given by Henry; the authority of the king, in the person of his representative, menaced with an armed force. There was no choice thenceforth but between submission and open resistance. In June Lord Dunmore fled with his family from Williamsburg on board a man-of-war, and in July a convention met at Richmond which organized a committee of safety, consisting of 11 gentlemen, endowed with almost dictatorial powers. Two regiments were directed to be immediately raised, and Patrick Henry was elected colonel of the first and commander of all forces to be enrolled; William Woodford, colonel of the second. Lord Dunmore at this time was ravaging the shores of the Chesapeake and threatening Norfolk, and the committee of safety were compelled to act promptly. They detached Col. Woodford at the head of the greater portion of the forces against the enemy, and the result was the battle of Great Bridge, in which the raw Virginia recruits drove back the best trained English grenadiers and gained a victory, sending Dunmore back to his ships. The action of the committee in passing over Henry was violently inveighed against by his friends, and the venerable Edmund Pendleton, the president, was especially assailed. The censure seems to have been wholly unjust. The right of the committee to assign a separate command to Col. Woodford was formally stated in Henry's commission, and Woodford's military experience determined the action of the committee in selecting him for this critical undertaking. The ardent feelings of Henry and his disappointment doubtless betrayed him into resigning his commission, which he speedily did, though between Pendleton and himself there was never any quarrel. He was a delegate to the convention which met in May, 1776, and instructed the Virginia deputies to the general congress to propose to that body to "declare the united colonies free and independent states." In the same year he was elected the first republican governor of Virginia, and from this time his career was rather that of the statesman and minister of public affairs, than the ardent, imposing, almost dazzling orator of revolution. He filled the office of governor by successive reelections till 1779, when he was no longer eligible. During this trying period he was eminently serviceable in sustaining public spirit and seconding the efforts of the great leaders of the revolution.

He returned to the legislative body, where he served throughout the war, at the termination of which he was again elected governor, and served until the autumn of 1786, when he resigned. In 1788 he was a member of the convention to ratify the federal constitution, an instrument whose adoption he opposed with all the strength and eloquence of his youth. Although this opposition afterward abated in a measure, he always remained fearful that the final result would be the destruction of the rights of the states. In 1794 he retired from the bar, and removed to his estate of Red Hill in Charlotte. In 1795 Washington appointed him secretary of state, in place of Edmund Randolph, who had resigned; but Henry declined the appointment, as he did that of envoy to France afterward offered him by Mr. Adams, and that of governor offered him in 1796. In March, 1799, yielding to the request of Washington and other distinguished persons, and desirous of doing his part to avert what he feared would be the disastrous results of the "resolutions of '98" just passed by the Virginia house, he ran for the state senate in his district. The great orator had only to indicate his wishes to fill any public position, and was easily elected; but he never took his seat. The speech at Charlotte Court House was his last, and it is said to have been worthy of his fame. He died less than three months afterward.—Patrick Henry was undoubtedly one of the most extraordinary men of an extraordinary epoch. In the house of burgesses he bore away the palm from Edmund Pendleton, Richard Henry Lee, George Mason, and the most powerful men of the time. In the general congress, the men of the north acknowledged that Henry was the greatest orator whom they had ever heard. Of this conspicuous endowment there are countless proofs, anecdotes, and traditions; and it is established beyond a rational doubt that Henry possessed a natural genius for moving men such as has rarely been bestowed upon humanity. Jefferson said that he seemed to him to speak "as Homer wrote." Undoubtedly a large part of his wonderful success was due to his moral courage. To that mysterious eloquence which swayed and took captive all minds, he united a nerve and resolution which when thoroughly aroused were indomitable. There was a hard stubborn fibre in his moral organization which resisted all attacks, and defied whatever attempted to move him. As a mere logician, apart from the advocate, Henry had no conspicuous talent. He was not a great lawyer, and his name remains connected with no large measures of policy under the new order of things, like that of Jefferson. He lives and will always live as the mouthpiece of the revolution, the voice which uttered most boldly and clearly the principles of human freedom. He was a man of the revolution, the representative of a convulsed epoch and an indignant people; the words which he uttered

were those which trembled upon the lips of millions. In person Henry was rather striking than prepossessing. Nearly six feet, spare, rawboned, and slightly stooping in the shoulders, he gave no indication of the majesty and grace which characterized his appearance when his genius was aroused. His complexion was sallow; his countenance grave, thoughtful, stern in repose, and marked with the lines of deep and painful reflection. His brows were habitually contracted, and communicated to his features an air of forbidding sternness and severity. The mouth, with closely compressed lips, and deep furrows at the corners, was set in an expression of unyielding resolution. When he spoke, however, a wonderful change passed over him. His person rose erect, his head, instead of stooping, was held proudly aloft, and the whole man seemed to undergo a transformation. The power which he possessed of expressing feeling by a simple movement of feature was extraordinary. The stern face would relax and grow soft, pensive, and gentle; or a withering rage would burn in the fiery eyes; or eyes, mouth, and voice would convey to the listener emotions of the tenderest pathos. In private life he was kindly, good-humored, and agreeable. He possessed a dry humor which was very attractive. He indulged in none of the vices of high living then prevalent; temperate, frugal, rarely drinking anything but water, he presented a strong contrast to his contemporaries. His reading was not extensive, but serious and solid. Livy was his favorite historian; but his reading was chiefly confined to the Bible. He was a devout Christian, and when governor printed and circulated at his own expense Soame Jenyns's "View of Christianity" and Butler's "Analogy." Sherlock's sermons he read every Sunday evening to his family, after which all joined in sacred music, while he accompanied them upon the violin. All the accounts of his personal bearing represent it as simple, plain, and cordial. There was an honest good feeling in his manner which induced the commonest persons to approach him with confidence. By this class he was almost idolized; and throughout his career he retained their unbounded admiration, attachment, and respect.—The life of Patrick Henry has been written by William Wirt (8vo, 1817), and by A. H. Everett, in Sparks's "American Biography."

HENRY, Philip, an English nonconformist divine, born in Whitehall, London, Aug. 24, 1681, died June 24, 1696. He was educated at Westminster school and at Christchurch, Oxford, was ordained to the ministry at Worthenbury, Flintshire, in 1657, was one of the clergymen who left the church of England in 1662 in consequence of the act of uniformity, and lived in seclusion till in 1687 he was permitted again to preach by the declaration of King James in favor of liberty of conscience. From that time he held public religious services near his residence at Broad Oak, and also

preached frequently elsewhere. His biography, by his son Matthew Henry (London, 1698), has passed through many editions.

HENRY, Robert, a Scottish historian, born in the parish of St. Ninian's, Stirlingshire, Feb. 18, 1718, died near Edinburgh, Nov. 24, 1790. He was educated at the university of Edinburgh, and was afterward master of the grammar school of Annan till in 1746 he was licensed as a preacher. He was pastor of a Presbyterian congregation at Carlisle from 1748 to 1760, at Berwick-upon-Tweed from 1760 to 1768, and afterward in Edinburgh. His principal work is a "History of Great Britain" (6 vols., Edinburgh and London, 1771-'93). It extended to the death of Henry VIII., and was continued to the accession of James I. by J. P. Andrews (London, 1794).

HENRY, William, an English chemist, born in Manchester, Dec. 12, 1775, died Sept. 2, 1836. He studied under Dr. Black of Edinburgh. Though he practised in Manchester as a physician, he gave particular attention to chemistry. In 1803 he published the law "that water takes up of gas condensed by one, two, or more additional atmospheres, a quantity which would be equal to twice, thrice, &c.; the volume absorbed under the common pressure of the atmosphere." His "Elements of Experimental Chemistry" (2 vols., London, 1810) reached its 11th edition in 1829.

HENRY THE HERMIT, or **Henry of Lausanne**, founder of the sect of the Henricians, born probably in Italy, died at Clairvaux, France, in 1149. He lived at first as an anchorite, but about 1113 abandoned his hermitage, and travelled through northern Italy, preaching his peculiar views. It is said that he rejected a great part of the Scriptures, baptized only adults, denied the real presence, suppressed the mass, declared churches and altars useless, and forbade the use of the cross as a symbol of worship, and prayers for the dead. He was tall and poorly clad, wore a hair shirt, shaved his beard, and walked barefoot. He was eloquent and earnest, and gained many disciples, having a reputation for piety and devotion. Driven by persecution, he crossed the Alps to Lausanne, and his reputation spread throughout France. He was invited to Le Mans, but first sent two disciples, and then followed them. He there excited a great opposition of the people to the priests, and the archbishop Hildebert interposed, forbidding him to preach, and ordering him to leave the diocese. Henry then went to Poitou, Languedoc, and Guienne, and made many disciples at Poitiers and Bordeaux. Driven still by persecution, he went to Dauphiny, where he met Peter de Bruys, whom he acknowledged as his master. His doctrines were so widely adopted, that Pope Eugenius III. in 1147 sent Cardinal Alberic, bishop of Ostia, to combat this heresy, accompanied by Geoffroy, bishop of Chartres, and St. Bernard, and asked the interference of temporal princes, especially of

the king of France and the duke of Savoy. Peter de Bruys was arrested and burned at the stake, but Henry escaped to Toulouse, and continued to spread his doctrines in Gascony and the adjacent countries. Bernard spoke against him, but without persuading the people, who cherished Henry and his doctrines. He was cited several times before the legate, but, admonished by the fate of Peter de Bruys, fled from city to city. He was taken at length, carried before the bishop of Toulouse, and finally before the council of Rheims in 1148, and convicted. Eugenius III. would not allow him to be burned, but condemned him to prison, where he soon died. His followers made common cause with the Vandois and Albigenes.

HENRY THE LION, duke of Saxony and Bavaria, born in 1129, died in Brunswick in 1195. His father, Henry the Haughty, had been outlawed and despoiled of his possessions for refusing to acknowledge the election of the emperor Conrad III. He died soon after, leaving his son, 10 years of age, to whom (as the Saxons had never succumbed to the decision of Conrad respecting their late duke) Saxony was speedily restored. In the diet at Frankfurt (1147) Henry formally demanded restitution of all his possessions, Bavaria having been bestowed upon Leopold, margrave of Austria. Conrad refused, and a war ensued, the results of which in the main were favorable to Henry. Frederick Barbarossa meanwhile succeeded Conrad (1152), and one of his first acts was to restore to Henry the Bavarian duchy. Henry's dominions, including part of modern Pomerania, now extended from the Baltic and North sea to the Alps. He was the head of the house of Guelph, and in all respects the most considerable of the German princes. He triumphed over a confederacy of church potentates who conspired against him in his own dominions; and in 1168 he espoused Matilda (or Maud) of England, sister of Richard Cœur de Lion. Under him Lübeck, which had been founded a few years before, was built up into a powerful city. Hamburg, which had been destroyed by the Wends, was rebuilt; Munich was founded; and improvements were everywhere encouraged in education and industry. But Henry had become unpopular with neighboring princes and bishops, who threatened to arrest his growing importance. He attacked them, devastated Thuringia, reconquered Bremen, and, having restored tranquillity along his frontiers, made a pilgrimage to the Holy Land (1172). Feeling now sufficiently powerful to decline service in the imperial expeditions in Italy, he withdrew his forces at a critical moment; and the immediate consequence was the overthrow of the emperor at Legnano (1176). On Frederick's return from Italy, after the peace of Venice (1177), he summoned the duke to appear before him in a diet at Worms. The summons, thrice repeated, was unheeded, and the contumacious prince was declared deposed and under the ban of the empire. His

fiefs were parcelled out among other princes, who marched in league to take possession. Henry beat them off, but the arrival of the emperor with overwhelming forces compelled him to retire to Lübeck, and at length into Holstein. He was forced soon after to humble himself at the feet of Frederick (1181), who banished him for three years to England, where he became the father of a son from whom the British Hanoverian sovereigns trace their descent. He was meanwhile reinstated in his hereditary possessions of Brunswick and Lüneburg, and at the end of the three years recrossed the channel to take personal possession. In consequence of asserted violation by the imperial authorities of his hereditary dominions, he undertook a war (1189) for their absolute recovery. Frederick died in 1190; when, after making peace and entering into a family alliance with Henry VI., by the marriage of his son with Agnes, cousin of the emperor, Henry at length found repose.

HENRY THE NAVIGATOR, a Portuguese prince, born March 4, 1394, died at Sagres, Nov. 13, 1460. He was the fourth son of King John I. of Portugal and Philippa, daughter of John of Gaunt, duke of Lancaster. While still a youth he displayed his courage in war with the Moors of Barbary, and was knighted for his bravery in the expedition which achieved the conquest of Ceuta in 1415. On his return from this expedition he fixed his residence at Sagres in Algarve, near Cape St. Vincent, and occupied himself with sending out vessels to cruise against the Moors and to harass the coast of Africa, where he made three campaigns. He was distinguished for learning, particularly for mathematical and geographical knowledge, and founded at Sagres an observatory and a school where young noblemen were instructed in the sciences connected with navigation. The first use of the compass in European navigation, and in part the invention of the astrolabe, are ascribed to him. His studies and inquiries led him to the conclusion that the coast of Africa did not end, as was then commonly supposed, at Cape Nun, and that great and valuable discoveries might be made by tracing its line to the southward into the unknown and dreaded torrid zone. The first expedition he sent for this purpose consisted of two vessels commanded by João Gonçalves Zarco and Tristram Vaz, who set out to pass Cape Nun, but were driven off the coast by storms, and accidentally discovered the little island of Porto Santo near Madeira. In the next year (1419) the same captains discovered and subsequently colonized Madeira. Prince Henry during the next 12 years sent vessel after vessel down the coast of Africa, some of which passed Cape Nun and reached Cape Bojador, 300 m. further south. But that cape, from the failure of repeated attempts to double it, was now popularly considered the limit of the habitable world, and there began to be much complaint in Portugal at the ex-

pense and hazard of these fruitless expeditions. But the prince persevered, and at length Gil Eannez, whom he sent out in 1433, succeeded in passing Cape Bojador, an achievement that created great excitement at the time, and which forms an era in the history of maritime discovery. The Azores had been visited shortly before. From 1434 to 1441 Prince Henry was chiefly occupied with the domestic affairs of Portugal, which were involved in much confusion. In 1441 the pope, at the request of Prince Henry, granted to the Portuguese crown all that it could conquer from Cape Bojador to the Indies. The discoveries of the Portuguese had by this time been extended to the mouth of a river nearly 200 m. S. of Cape Bojador. In 1445 the prince sent a vessel under command of Diniz Dyaz or Diniz Fernandez, who sailed down the coast till he reached Cape Verd; the longest advance at one effort that had yet been made by Europeans in African navigation. By this time the popular feeling had changed with regard to these voyages, many of which brought not only honor and fame but profitable returns in gold and slaves, and numbers of enterprising men were ready to engage in them. In 1447 a fleet of 14 vessels was fitted out at Lagos, and the command given by Prince Henry to Lançarote, and sent to the African coast, but without any greater result than extending the limit of discovery to the river Gambia. Several other expeditions in the same direction were subsequently sent out by the Portuguese government, under the advice and control of Prince Henry, one of which just before his death reached Sierra Leone. The Portuguese historian Faria y Sousa, in his *Asia Portuguesa* (Lisbon, 1666), thus sums up the character of Prince Henry: "He was bulky and strong; his complexion red and white; his hair coarse and shaggy. His aspect produced fear in those who were not accustomed to him; not in those who were, for, even in the strongest current of his vexation at anything, his courtesy always prevailed over his anger. He was patient in labor, bold and valorous in war, versed in arts and letters; a skilful fencer; in the mathematics superior to all men of his time; generous in the extreme, and zealous in the extreme for the increase of the faith. No bad habit was known in him. He did not marry, nor was it known that he ever violated the purity of continency."

HENRYSON, Robert, a Scottish poet of the 15th century. Of the particulars of his life and the time of his death little or nothing is known. Dunbar, in his "Lament" (1508), speaks of "gude Mr. Robert Henryson" as among the departed poets. He seems to have been chief schoolmaster at Dunfermline, and was not unlikely an ecclesiastic, and perhaps a Benedictine monk. One account identifies him with Henryson of Fordell, father of James Henryson, who perished in the battle of Flodden. His principal work is his collection of

"Fables," 13 in number, which was edited by Dr. Irving in 1832. Among his other writings are the tale of "Orpheus Kyng, and how he geid to Hewyn and Hel to seik his Quene" (Edinburgh, 1508); "Testament of Cresseid" (1593), a poem which was suggested by and was a sequel to Chaucer's "Troilus and Cresseid," in connection with which it generally appears; "Robin and Makyne," printed in Percy's "Reliques;" and several smaller poems, printed in different works.

HENSEL. I. Wilhelm, a German painter, born at Trebbin, Prussia, July 6, 1794, died in Berlin, Nov. 26, 1861. He studied five years in Italy, and on his return to Berlin in 1828 became professor at the academy of fine arts. He died from injuries received while assisting a stranger who was thrown out of an omnibus. One of his best pictures is "Christ before Pilate." **II. Fanny**, a German pianist, wife of the preceding, born in Hamburg, Nov. 14, 1805, died in Berlin, May 14, 1847. She was the sister of Mendelssohn, and wrote in imitation of his style small compositions for the piano, and a few songs. She possessed a fine musical organization. Mendelssohn was devoted to her, and never rallied from the effect of her death.—Her sisters **LUISE** and **WILHELMINE** wrote poetry which was collectively published by Kletke (Berlin, 1857).

HENSELT, Adolph, a German pianist, born at Schwabach, Bavaria, May 12, 1814. He first studied the violin, but abandoned it for the piano. At the age of 17 he attracted the attention of the king of Bavaria, through whose aid he was enabled to go to Weimar and place himself under the instruction of Hummel. From Weimar he went to Vienna in 1832, to study counterpoint under Sechter. He practised at the piano 10 hours a day, and soon injured his health by excess of work. For change of air he went to Berlin in 1836, and from thence to Dresden and St. Petersburg, where he was made pianist to the empress. Here he continued to reside, making in 20 years only one journey, which extended to London and the principal capitals of Europe. He holds the first rank among pianists, though his timidity has hindered him from playing much in public. He has not composed much, nor are his works of a high merit. The most important is a concerto in F minor for piano and orchestra, a composition of much technical difficulty.

HENSHAW, John Prentiss Kewley, an American bishop, born at Middletown, Conn., June 13, 1792, died at Frederick, Md., July 20, 1852. He entered Middlebury college, Vermont, when he was 12 years old, and graduated in 1808. Though educated a Congregationalist, he was led to become an Episcopalian, was baptized when on a visit to his native place, and became a lay reader in Middlebury, and later in Marblehead, Mass. He was ordained deacon in 1813, and priest in 1816. He served for several years in St. Ann's church, Brooklyn, N. Y., and in 1817 was called to Balti-

more, where he was rector of St. Peter's church for 26 years. Being elected bishop of Rhode Island, he was consecrated Aug. 11, 1843, and became also rector of Grace church, Providence. In the summer of 1852 he was requested to perform episcopal duties in Maryland, during the absence of Bishop Whittingham on account of ill health. While actively engaged in this work he was stricken with apoplexy. His publications include "Theology for the People" (1840); "Memoir of Bishop R. C. Moore" (1842); "Inquiry concerning the Second Advent" (1842); and "Lectures on the Terms Priest, Altar, Sacrifice, as used in the Prayer Book" (1843).

HENSLEY, Eliza. See **FERDINAND (AUGUSTUS FRANCIS ANTHONY)**.

HENTZ, Caroline Lee, an American authoress, born at Lancaster, Mass., in 1800, died at Mariana, Fla., Feb. 11, 1856. She was the daughter of Gen. John Whiting, and married in 1825 Mr. N. M. Hentz, who was afterward appointed professor at Chapel Hill college, N. C. At Covington, Ky., whither they removed from Chapel Hill, she wrote "De Lara, or the Moorish Bride," a play which obtained a prize of \$500. She lived successively in Cincinnati, Florence, Ala., Tuscaloosa, Tuskegee, and Columbus, Ga. Her writings include "Aunt Patty's Scrap Book" (1846); "The Mob Cap" (1848); "Linda, or the Young Pilot of the Belle Creole" (1850); "Rena, or the Snowbird" (1851); "Marcus Marland, or the Long Moss Spring" (1852); "Eoline, or Magnolia Vale" (1852); "Wild Jack" (1853); "Helen and Arthur, or Miss Thusa's Spinning Wheel" (1853); "The Planter's Northern Bride" (1854); and "Ernest Linwood" (1856).

HENZEY, Léon Alexandre, a French archaeologist, born in Rouen in 1831. He studied at the normal school in Paris and at the French school in Athens, and became professor of history and archaeology at the school of fine arts. He published, as the result of his personal researches, *Le Mont Olympe et l'Acarnanie* (1860); and Napoleon III. having sent him to Macedonia and adjoining regions, he published with M. Daumet, *Mission archéologique de Macédoine: fouilles et recherches exécutées dans cette contrée et dans les parties adjacentes de la Thrace, de la Thessalie, de l'Illyrie et de l'Épire* in 1861 (1864 et seq.). In 1872 he published *Un palais grec en Macédoine*, narrating his discovery at Palatitza.

HEPATICA, a genus of plants of the order *ranunculaceae*, so closely allied to *anemone* that some botanists place it as a section of that genus. The common name is liver-leaf, and it is sometimes incorrectly called liverwort, a name that should be restricted to a family of cryptogamous plants. The botanical name and its popular one both have reference to a fancied resemblance in shape between the leaves of the plant and the liver. The old herbalists, who believed in the doctrine of signatures, assumed that each medicinal plant indicated in

some manner the disease it would cure or the portion of the body it would affect, and hepatica was at one time used for liver complaints; but it is nearly destitute of active properties, being at most a demulcent. The hepaticas are stemless perennials, with numerous radical, heart-shaped, three-lobed, thick, persistent leaves, from among which there rise in early spring numerous hairy scapes, each bearing a single flower; the flowers are without petals, the colored calyx appearing like a corolla, and the three-leaved involucre is so close to the flower as to appear like a calyx; the sepals in the wild state are six to nine, blue, purple, or even white; stamens and pistils numerous. The commonest species, *H. triloba*, is widely distributed in the cooler portions of both hemispheres; *H. acutiloba* has the lobes of the leaves pointed, while in the other they are very obtuse and rounded, and may be only a variety of the preceding; it is found from Vermont to



Hepatica triloba.

Wisconsin. Both species grow in rich woods among the fallen leaves, and lift up their bright flowers soon after the snow has gone. The single-flowered *H. triloba*, with several double varieties, with flowers of various shades of red, blue, purple, and crimson, as well as white-flowered ones, are in cultivation in Europe. In this country they do not succeed, exposed to the heats of our long summers, unless in a moist rich soil. The double varieties are increased by division. A species or a marked variety, *H. angulosa*, has recently been brought into cultivation from Transylvania; it is much larger than ours, the flowers being sometimes two inches across.

HEPHESTION, a Macedonian, the friend and companion of Alexander the Great, with whom he had been brought up. When, at the commencement of his Asiatic expedition, Alexander visited the site of Troy, Hephæstion accompanied him. He was frequently intrusted with

commands of great importance, and for his services was rewarded with a golden crown on his arrival at Susa, and received in marriage Drypetis, the daughter of Darius and sister of Statira. From Susa he accompanied Alexander to Ecbatana, where he died of fever after an illness of seven days (325 or 324 B. C.). Alexander's grief was excessive. His body was transported to Babylon, where a magnificent pyre and monument were erected; and orders were issued for a general mourning throughout the empire, and divine honors to the deceased hero.

HEPHESTUS. See VULCAN.

HEPTARCHY. See ENGLAND, vol. vi., p. 607.

HEPWORTH, George Hughes, an American clergyman, born in Boston, Feb. 4, 1833. He graduated at the theological school of Harvard university in 1855, and was called to the Unitarian church in Nantucket, where he remained two years. In 1858 he removed to Boston and became pastor of the church of the Unity. In December, 1862, he was appointed chaplain of the 47th regiment of Massachusetts volunteers, and in 1863 served on the staff of Gen. Banks in Louisiana. In 1870 he accepted the pastorate of the church of the Messiah, New York, but resigned it in 1872, in consequence of a change of religious belief in the direction of Trinitarianism. He afterward organized and is now (1874) pastor of the "Church of the Disciples" in New York. He has published "Whip, Hoe, and Sword" (Boston, 1864), and "Rocks and Shoals" (1870).

HERA. See JUNO.

HERACLEA, the name of several ancient Greek cities, the most important of which were: I. A city of Magna Græcia, in Lucania, near the Tarentine gulf, founded by a colony of Thurians and Tarentines about 432 B. C. It was the place for the general assembly of the Italiote Greeks, until Alexander, king of Epirus, transferred it to Thurii. Heraclea was the scene of the first conflict between Pyrrhus and the Romans, the consul Lævinus being defeated there in 280. In 278 an advantageous treaty was made with Rome, which was maintained as long as the republic lasted, and Heraclea was flourishing in the time of Cicero. Its site is now marked by heaps of rubbish, where many coins and bronzes have been discovered; and near there were discovered in 1732 the celebrated *tabulae Heracleenses*, now in the national museum at Naples. These are fragments of two bronze tables, containing on one side Greek inscriptions with reference to certain fields sacred to Bacchus and Minerva, and on the other side a Latin inscription relating to the municipal regulations of Heraclea, which is in fact a copy of the more general *lex Julia municipalis* issued in 45 B. C. The Latin inscription was explained by Savigny in his *Zeitschrift für geschichtliche Rechtswissenschaft*, and both inscriptions were published and illustrated by Mazocchi in his *In Regii Herculanensis Musei Tabulas Heracleenses Commentarii* (Naples, 1754-'5). II. A city of Sicily, on the

S. W. coast of the island, at the mouth of the river Halycus, said to have been founded by Minos, and hence surnamed Minoa. About 510 B. C. Euryleon came to Sicily with the Spartan prince Dorieus to reclaim the territory of Hercules, and, escaping from the defeat of Dorieus, subdued Heraclea, which probably received its name from him. It rose rapidly in prosperity, but was destroyed by the Carthaginians, and was for many years an insignificant place, subject to the Carthaginians or to Agathocles. It revolted in 307, but was soon subdued. It was taken by Pyrrhus, and in 260 by Hanno, and made a rendezvous for the Carthaginian fleet, which there suffered a great defeat from Regulus and Manlius. It was alternately held by the Romans and Carthaginians, and held out against Marcellus even after the fall of Syracuse. **III.** A city of Bithynia, surnamed Pontica (now *Eregli* or *Erekli*), on the S. shore of the Euxine. It had two good harbors, the smaller made artificially. It was founded by a colony of Megarians and Boeotians, and rose to supremacy over the neighboring regions. During the reign of Dionysius, one of its tyrants, in the time of Alexander the Great, it reached great prosperity. It suffered from the kings of Bithynia and from the Galatians, and in the war of the Romans against Mithridates it was partly destroyed by Aurelius Cotta. (See *EREGLI*.)

HERACLES. See *HERCULES*.

HERACLIDÆ. See *GREECE*, vol. viii., p. 187.

HERACLITUS, a Greek philosopher who flourished at the close of the 6th century B. C. He was a native of Ephesus, and from his gloomy disposition was styled the "weeping philosopher." In his youth he travelled extensively, and on his return to Ephesus was offered the chief magistracy of the city, but declined it because of the bad morals of the Ephesians, and employed himself in playing at dice near the temple of Diana, declaring even that to be a more profitable occupation than attempting to govern his fellow citizens. Afterward he became a confirmed recluse, retiring for a time to the mountains, and living on herbs. His philosophical creed was embodied in a work commonly entitled *Περὶ Φύσεως*, "On Nature." The most remarkable tenets of this creed were that, by the operation of a light ethereal fluid, constantly active, self-changing, and all-transforming, which he denominated fire, all things in the universe, animate and inanimate, material and immaterial, were created and shaped, and that acquiescence in the decrees of the supreme law was the great duty of man. His style was so obscure that the Greeks surnamed him "the unintelligible." He was regarded in antiquity as the antipodes of Democritus, the "laughing philosopher." The fragments of his treatise were published by Schleiermacher in Wolf and Buttmann's *Museum der Alterthumswissenschaft*, and by Ferdinand Lassalle in his *Die Philosophie Herakleitos' des Dunkeln von Ephesos* (2 vols., Berlin, 1858).

HERACLIUS, a Roman emperor of the East, born in Cappadocia about A. D. 575, died early in 641. He was the son of Heraclius, exarch of Africa, and first appeared in a public capacity in 610, when his father sent him with a fleet to besiege Constantinople, and dethrone the tyrant Phocas. This enterprise he accomplished, and was himself chosen to fill the vacant throne. At the accession of Heraclius, the empire was in a deplorable condition. The barbarians of the north were laying waste its European provinces, while the Persians, under Chosroes II., were overrunning and ravaging those of the east. The first object of the new emperor was to protect his European dominions and to make provision for their future security. The king of the Avars having withdrawn from before Constantinople, after treacherously slaying or taking captive immense numbers of citizens who had come out to witness an interview between him and Heraclius, the latter allotted that part of Illyricum bordering on the Adriatic and the Danube, which had been depopulated, to the Serbs and Croats, in order that they might serve as a barrier to his N. W. frontier. Then, turning his attention eastward, as soon as he considered his army sufficiently disciplined to take the field, he placed himself at its head, and sailing from the Bosphorus in 622, landed in Cilicia, and encamped on the plain of Issus, where he defeated a large Persian force. From Cilicia he fought his way into Pontus, and afterward returned to Constantinople. In the following spring he landed at Trapezus (Trebizond) with another army, whence, marching through the regions of the Caucasus, he penetrated into Media, forming alliances and destroying the temples of the Magi as he proceeded. This campaign was closed by a second brilliant victory over the Persians commanded by Chosroes in person. In 625 he invaded Mesopotamia, and returning through Cilicia, gained a third great victory over the Persians on the river Sarus, where he slew with his own hand a gigantic barbarian whom all feared to encounter. The last campaign of this war was by far the most glorious. Constantinople was besieged by a great host of Persians and Avars, but instead of going to its relief Heraclius marched into the very heart of the Persian empire, overthrew the enemy in a great battle near Nineveh in December, 627, took Dastagerd, the favorite residence of Chosroes, and plundered the royal palaces in the vicinity of untold treasure. In 628, Chosroes having been put to death by his son Siroes, the latter acceded to a treaty which closed the war and restored to Heraclius the provinces wrested from his predecessor. But at Edessa, as he was returning from the war, an ambassador from Mohammed summoned him to embrace the faith of the prophet. Heraclius made a treaty of amity with the Arabian potentate; but in a little time a war broke out between the Arabs and the eastern emperor, in which Syria, Palestine, and Egypt were wrested from



Shield.



Or.



Argent.



Gules.



Azure.



Sable.



Vert.



Purpure.



Per Pale.



Per Fess.



Ermine.



Erminois.



Vair.



Potent.



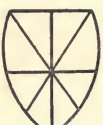
Per Bend.



Quarterly.

Quarterly
of Eight.Quarterly
Quartered.

Per Saltier.



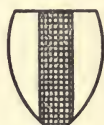
Gyronny.



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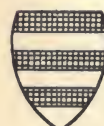
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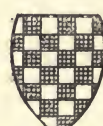
Paly Bendy.



Barry Bendy.



Lozengy.



Chequy.



Fretty.



Label.



Crescent.



Mullet.



Martlet.



Annulet.



Fleur-de-Lys.



Rose.



Cross Moline.

Double
Quatrefoil.



Statant.



Passant.



Rampant.



Saliant.



Sejant.



Couchant.



Demi-Lion.



Combattant.



At Gaze.



Trippant.



Lodged.



Caboched.



Displayed.



Rising.



Double Eagle.



Close.



Pelican.



Natant.



Hauriant.



Urinant.



Embowed.



Wavy.



Nowed.



Involved.



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St. Anthony.



Potant.



Maltese.



Fleurie.



Urdé.



Crosslet.



Cliché Fitché.



Griffin.



Dragon.



Cockatrice.



Wyvern.



Phoenix.



Peacock.



Manche.



Carbuncle.



Chess Rook.



Pheon.



Portcullis.



Trellis.



Waterbougets.



Escallop.



Mullet-perce.



Star or Etoile.



Trefoil.



Quatrefoil &
Cinquefoil.



Lure.



Hand Sinister.



Galley.



Garb.



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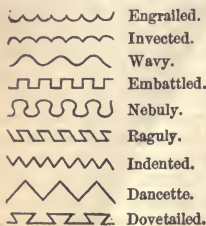
Over All.

the latter. Heraclius took no part personally in this contest, but spent his latter days in luxurious ease in Constantinople.

HERALDRY, the art or science of blazoning or describing in appropriate technical terms coats of arms, badges, and other heraldic and armorial insignia. The use of distinctive devices, both national and personal, is very ancient. The eagle was the emblem of Persia and of imperial Rome, the ox of Egypt, the owl of Athens; and the dragon has served as the national symbol of China and Japan from the most remote times. The warriors of Greece bore distinguishing symbols on their shields, and at Rome the families of those who had held a curule office had the right to display waxen images of their ancestors as a mark of hereditary distinction. But heraldry, in the present acceptation of the term, is a comparatively modern invention, and cannot be traced as a system to a time earlier than the close of the 12th century. It is generally admitted to have had its origin in the necessity, in battles and in tournaments, of using some device to distinguish persons concealed by their armor. It was gradually elaborated during the crusades in the time of Richard I., and it was probably systematized to some extent by the Germans; but to the French is due the credit of perfecting it and reducing it to a strict system, and the technical nomenclature invented by them was adopted with slight modifications by other nations. By the end of the 13th century heraldry had become bound by strict rules and terms, and from this time onward arms were displayed on coins, monumental brasses, and tombs, and in architectural decorations, and were borne on shields, banners, and military surcoats. From their use on garments is derived the phrase "coat of arms."—The rules of heraldry, as now practised, are comparatively modern, and differ somewhat in different countries. The general principles however are the same, and as it will be impossible to enter into minor details, this article will be confined to English heraldry. According to early authorities arms are divisible into ten classes, but these may be reduced to three: arms of states, of communities, and of persons and families. Arms of states are those assumed by sovereign princes or by governments as distinguishing badges for their respective kingdoms, empires, or states. Arms of communities include those of ecclesiastical, lay, and municipal corporations. Arms of persons and families are insignia borne by individuals and families, generally by right of inheritance or of grant. All these classes of arms follow the same general heraldic rules, and are displayed on a shield or escutcheon. There is no prescribed form for the shield, which has differed in different ages and among different nations, but the shape usually adopted is that in the accompanying plate. The shields of maids and widows are in the form of a lozenge. The face of the shield, on which the arms are blazoned, is technically called the

field. To facilitate description, heralds divide this into nine parts (see plate), viz.: A, the dexter chief; B, middle chief; C, sinister chief; D, honor point; E, fess point; F, nombril or navel point; G, dexter base; H, middle base; and I, sinister base. The shield is always described with reference to the position of the bearer, which brings the dexter or right side opposite the left hand of the observer. Fields are diversified by tinctures, lines of division, and charges. Tinctures are composed of metals, colors, and furs. Metals are or (gold) and argent (silver). Colors are gules (red), azure (blue), sable (black), vert (green), and purple (purple). The furs are ermine, vair, and potent. Ermine is a field argent with spots or tails sable. When this is reversed, a field sable with spots argent, it is termed *ermine*. Ermineois is a field or with spots sable, and pean a field sable with spots or. Vair (*Lat. varius*), supposed to represent the skin of the squirrel, is expressed by several rows of little shields or bells, alternately argent and azure, the base of the argent ones against the base of the azure. In counter vair the bells of the same tincture are placed base against base and point against point, or counterplaced, as it is technically called. Potent, though classed as a fur, signifies a crutch or gibbet (*Fr. potence*). The crutches, argent and azure, are placed as in the plate. In potent counter potent the crutches are counterplaced. If the colors used in vair and potent are other than argent and azure, they must be specified; if not, it is unnecessary. In drawings and engravings the tinctures are designated by dots and lines. Thus or is known by the shield being filled with dots, argent by a plain shield, gules by vertical lines, azure by horizontal lines, &c. This invention is attributed to both the French heraldist De la Columbière and the Italian Silvestro di Petrasancta. The earliest example in England of this method of indication is found on some of the seals attached to the death warrant of Charles I.—The field being often of a combination of colors, it is variously divided by lines. When the division is into two equal parts by a vertical line, it is said to be parted or party per pale; by a horizontal line, per fess; by a dexter diagonal line, per bend; by a sinister diagonal line, per bend sinister; by a vertical and a horizontal line crossing at right angles, per cross or quartered; by diagonal lines crossing, per saltier; by two lines starting from the sides in the dexter and sinister bases and meeting in an angle in the fess point, per chevron; and by vertical, horizontal, and diagonal lines into eight equal parts, *gironny*. When a shield is quartered, the several quarters are numbered, the dexter upper quarter being called the first, the sinister upper the second, the dexter base the third, and the sinister base the fourth. If one or more of these divisions is subdivided into quarters, it is said to be quarterly quartered, and the quarter thus quartered is called a grand quarter. A shield divided into any

number of parts by lines drawn through it at right angles to each other is said to be quarterly of the number; thus, if divided into eight parts by three vertical lines crossed by one horizontal, it is said to be quarterly of eight. All of these divisions are multiplied by the use of a variety of lines, the principal of which are called engrailed, invected, wavy, embattled, nebuly, raguly, indented, dancette, and dove-



Partition Lines.

tailed. When any of these lines are used in the division of a shield instead of straight lines, it must be described, as party per pale wavy, party per fess indented, &c. The term parted or party may be omitted as superfluous, it being understood in phrases like the preceding.—A charge is any emblem or figure borne in a field, and the field thus blazoned is said to be charged. Charges are divided into honorable ordinaries, subordinaries, and common charges. The honorable ordinaries, which are the principal charges in heraldry, are nine, viz.: the chief, pale, bend, bend sinister, fess, bar, chevron, cross, and saltier, the most of which have diminutives. The chief occupies the upper one third of the shield, determined by a horizontal line. Its diminutive is the fillet, one fourth its width and occupying its lower edge. The pale is formed by two parallel vertical lines drawn from the middle chief to the middle base, and occupying one third of the field. It has two diminutives, the pallet of one half its width and the endorse of one fourth its width, which frequently accompany the pale. The bend is formed by two diagonal lines drawn from the dexter chief to the sinister base, and is one fifth the width of the field. Its diminutives are the bendlet or garter of one half its width, the cost or cotise of one fourth its width, and the riband of one eighth its width and coupé or cut off at the ends. The bend sinister is like the bend, but is drawn from the sinister chief to the dexter base. Its diminutives are the scarpe of one half its width, and the baton of one fourth its width and coupé at the ends. The baton and the riband are generally considered to indicate illegitimacy. The fess is formed by two parallel horizontal lines drawn through the middle of the field and occupying one third of it. The bar is similar to the fess, but occupies only one fifth of the field, and differs from it in that it is not confined to the middle, but may be placed in any part of the field; there may be also several bars in a field. Its diminutives are the barrulet of one half its width, and the closet of one fourth its width. The latter is never borne single. The chevron is a figure formed of two bars drawn from the dexter and sinister bases and meeting in an angle in the fess point. Its diminutives are

the chevronel of one half its width, and the couple-close of one fourth its width. The latter is borne in couples, generally one on each side of the chevron. The cross is a combination of the pale and the fess. This is the Greek cross, which is the only one included in honorable ordinaries. All variations of it are common charges. The saltier is a combination of the bend and the bend sinister. All of the honorable ordinaries may be engrailed, wavy, indented, &c., and may themselves be charged or borne between charges.—The subordinaries are the bordure or border, orle, inescutcheon, quarter, canton, gyron, billet, pale or pall, pile, flanch or flaque, lozenge, mascle, rustre, fusil, and fret. The bordure is a stripe surrounding the shield, and is one fifth the width of the field. It passes over all the ordinaries except a chief, a quarter, and a canton. When divided into squares of alternate metal and color, it is said to be compony or gobony; when into two rows of squares, counter-compony; when into three or more rows, chequy. The bordure is often used to distinguish different branches of a family, and the bordure wavy is now the general mark to denote illegitimacy. The orle is one half the width of the bordure, and is borne within the shield and not extending to its edge. The inescutcheon is a small escutcheon borne within the shield. The quarter is a square occupying the upper dexter quarter of the field. The canton is like the quarter but smaller, and occupies the dexter chief; if placed in the sinister chief, it must be described as a canton sinister. The gyron is formed by intersecting the quarter by a diagonal line bendwise. The billet is an oblong rectangular figure twice as long as broad. The pall is a figure like the letter Y, representing the pall of an archbishop. The pile is a wedge-like figure issuing, unless otherwise specified, from the middle chief, and extending to the nombril point or lower. Flanches, which are always borne in pairs, are formed by curved lines drawn from the upper angles to the respective base points. The lozenge is a figure of four equal sides, the upper and lower angles of which are acute and the others obtuse. The mascle is a lozenge perforated so as to make it only a narrow border. The rustre is a lozenge with a circular perforation. The fusil is an elongated lozenge. The fret is formed by the interlacing of a figure like a saltier with a mascle.—A distinct group of charges are called roundles and guttae or gouttes, both of which may be of different tinctures. The roundle is circular, the goutte is round at the bottom and pointed at the top. Roundles of or are called bezants, of argent plates, of gules torteaux, of azure hurtes, of sable pellets or ogresses, of vert pommes, of purple golpes. A roundle barry wavy of six, argent and azure, is called a fountain. Gouttes of or are called d'or, of argent d'eau, of gules de sang, of azure de larmes, of sable de poix, of vert d'olive.—Charges and tinctures may be varied so as to

cover the entire field. When the field is divided into an even number of partitions palewise, it is said to be paly, the number being always specified, as paly of six, paly of eight, &c. When divided bendwise it is called bendy, and when barwise barry. If there are more than eight bars, it is said to be barruly. Paly-bendy is when the field is divided by lines in the direction of the pale and bend; barry-bendy, in the direction of the bar and bend. Gyronny, lozengy, fusilly, and chequy indicate that the field is divided by lines in the direction of the sides of these several figures. The pales, gyrons, checks, &c., thus formed, are varied with different tinctures. A shield is said to be fretty when the field is covered with narrow bars in the direction of the bend and bend sinister, and interlaced.—Common charges are every device on a shield other than the ordinaries and subordinaries. These include beasts, birds, fishes, shells, reptiles, insects, the human figure, imaginary beings, celestial bodies, trees, plants, and flowers, and miscellaneous inanimate objects. The principal beasts in heraldry are the lion, bear, tiger, leopard, bull, boar, wolf, antelope, stag, goat, fox, badger, talbot or hound, horse, beaver, and squirrel. The lion is one of the most noble and most frequent of charges, and previous to the 18th century constituted almost the sole armorial device. He is represented in many attitudes, as sejant, passant, rampant, &c., and may be of a metal, fur, or color. He is said to be guardant when his head is affronté or full-faced, and regardant when his head is turned toward the sinister side. All charges must be represented as moving toward the dexter side of the field, unless otherwise specified; if moving toward the sinister side, they must be described as contourné. Beasts of prey are said to be armed of a tincture when their teeth, talons, or claws are of that tincture. When the tongue is shown, they are said to be langued of that tincture; animals with hoofs tinctured are unguled of that tincture, and stags and other docile animals, whose horns are colored, are attired of that tincture. When the heads or other parts of beasts are borne as charges, if cut off smooth they are said to be coupé; if with a jagged edge, erased. The principal birds used as charges are the eagle, falcon, swan, gamecock, chough, pelican, heron, popinjay or parrot, crow, goose, sheldrake, ostrich, raven, owl, dove, peacock, and bat. The eagle, as the noblest of birds, is one of the most honorable of charges. It is generally represented as displayed, but sometimes as rising or close. The double-headed eagle, adopted by the Russian, German, and Austrian emperors as the successors of the Roman emperors, is supposed to have symbolized the union of the eastern and western empires. A pelican sitting on her nest feeding her young is called "in her piety," and a peacock with tail displayed "in his pride." Of fish, the dolphin is the most common charge; in France its use was formerly

restricted to the dauphin. Other fish used are the lucie or pike, roach, salmon, sturgeon, eel, trout, and herring. Of shells, only the escallop and whelk are found among charges; the former dates from the crusades. The reptiles and insects most commonly used are the serpent, tortoise, scorpion, bee, butterfly, and grasshopper. The human figure often occurs in charges, either whole or in parts, naked or vested. The parts used are heads, arms, legs, &c., and these may be either coupé or erased. Of imaginary beings, the griffin, dragon, unicorn, cockatrice, wyvern, triton, and mermaid are common. The celestial bodies, trees, plants, and flowers of many kinds, and many miscellaneous objects, such as helmets, swords, arrows, horseshoes, and buckles, are also used as charges. The numerous variations of the Greek cross are usually ranked as common charges. According to Guillim, there are 39 varieties, to Leigh 46, to Edmondson 109, to Robson 222, and to Berry 385. For some of the principal ones see the plate.—Charges are blazoned either on the field or on an ordinary or other charge. When on the latter, they are said to be in fess, in pale, in cross, in orle, &c. Sometimes an ordinary is placed over a charge, when the latter is said to be deboursé by the former. When represented of its natural color, a charge is called proper. It is considered false heraldry to put metal on metal or color on color; but this rule does not hold when a field consists of two tinctures, as of metal and color. In such a case a charge placed on it is sometimes countercharged, which implies that the field and the charge are of the same tinctures, but reversed, so that metal may be on color and color on metal. A charge is said to be over all when it is placed on top of all other charges. A series of nine emblems called differences or marks of cadency are used to distinguish the several sons in a family and the subordinate branches of each house. The eldest son bears in his arms the label, the second the crescent, the third the mullet, the fourth the martlet, the fifth the annulet, the sixth the fleur-de-lys, the seventh the rose, the eighth the cross moline, the ninth the double quatrefoil. In England none but the label is used to distinguish younger sons of the royal family, it being varied by additional pendants and by charges. When marks of cadency are used to distinguish subordinate branches of each house, they are charged with the same. For instance, the first son of the second house bears a crescent charged with a label, the second son of the second house a crescent charged with a crescent, &c.—Marshalling of arms is the orderly arrangement of a number of coats of arms within one shield, by impaling or quartering. A married man has the right to impale his wife's paternal arms, by placing them on the sinister side of his own shield. The joining of one half of his own coat with one half of his wife's in the same shield is called

dimidiation, but this has now fallen into disuse. If the wife is an heiress, her arms may be borne on an escutcheon over his own, called an escutcheon of pretence. A widow impales her father's and her husband's arms in a lozenge; but if an heiress, she may bear her father's arms in an escutcheon of pretence over her husband's. Where several coats of arms have been acquired by intermarriages of ancestors with heiresses, they are quartered in one shield. According to some authorities, only eight quarterings should be admitted in a family escutcheon; others admit sixteen, but more than 100 shields have sometimes been quartered in one field.—Besides the devices borne on the shield, a coat of arms has often a number of exterior ornaments, viz.: the crown or coronet, helmet, mantlings, wreath, crest, scroll and motto, and supporters. The crown or coronet is borne above the shield by those privileged to bear it. (See CORONET.) Helmets are of four kinds. Those of kings and princes of the blood royal are of gold, full faced, with the beauvoir divided by six projecting bars and lined with crimson; of nobles, steel with five gold bars, and inclining to a profile; of knights and baronets, steel with visor open and without bars, and full faced; and of esquires and gentlemen, steel with visor closed, and in profile. The mantling or lambrequin is a kind of scrollwork, flowing from the helmet. The wreath is formed of the two principal colors of the arms, and surrounds the top of the helmet like a fillet. Out of it rises the crest (Lat. *crista*, a comb), the uppermost device of a coat of arms. The crest is almost as ancient as devices upon shields, and was worn on the helmet by those of high rank or of noted valor as a means of distinguishing them in battle, from which it was sometimes called a cognizance. Unless stated to be on a chapeau or coronet, it is always on a wreath. No crest is allowed to a female. The scroll and motto are placed beneath the shield. Supporters are figures standing on the scroll on each side of the shield which they seem to support.—The offices of heraldry are performed by heralds, whose chief duties consist in the blazoning of arms, the preservation of heraldic records and of pedigrees, and the conducting of public ceremonies, such as coronations, the creation of peers, marriages, funerals, &c. In England heralds are merged in a corporation called the college of arms or heralds' college, which was instituted by Richard III. in 1483. At the head of the college is the earl marshal of England, a dignity which has been hereditary since 1672 in the family of Howard, dukes of Norfolk. The royal commands are directed to him, and under his care are prepared the programmes for public ceremonies. Under him are three kings-at-arms, styled Garter, Clarenceux, and Norroy. Their subordinates are six heralds, called respectively Chester, Lancaster, Richmond, York, Windsor, and Somerset, and four pursuivants, portcullis, rouge-dragon, blue-

mantle, and rouge-croix. The Bath king-at-arms, attached to the order of the Bath, is not a member of the college of heralds. In Scotland the principal heraldic official is the Lyon king-at-arms, who holds the position by commission under the great seal. He has six subordinate heralds, styled Rothesay, Marchmont, Albany, Ross, Snowdon, and Islay, and six pursuivants, Kintyre, Dingwall, Carrick, Ormond, Unicorn, and Bute. The chief officer for Ireland is the Ulster king-at-arms, who is appointed by the crown. He has two heralds, Cork and Dublin, and two pursuivants, Athlone and St. Patrick.—The following are a few of the principal works on heraldry: Guillim, "Display of Heraldry" (London, 1610); Dugdale, "The Ancient Usage in bearing Arms" (London, 1682); Nisbet, "System of Heraldry" (Edinburgh, 1722); Berry, "Complete Body of Heraldry" (2 vols. folio, London, 1780), and "Encyclopædia Heraldica" (3 vols., 1828); Robson, "British Heraldry" (London, 1830); Von Biedenfeld, *Die Heraldik*, &c. (4to, Weimar, 1846); Burke, "General Armory of Great Britain and Ireland" (London, 1847); Saladini, *Teatro araldico* (8 vols. 4to, Milan, 1841); Grandmaison, *Dictionnaire héraldique* (8vo, Paris, 1852); De Magny, *La science du blason* (8vo, Paris, 1858-'60); Pifferrer, *No-biliario de los reinos y señoríos de España, ilustrado con un diccionario de heráldica* (6 vols. 8vo, Madrid, 1857-'60); Bouton, *Nouveau traité du blason* (Paris, 1862); and Boutell, "English Heraldry" (London, 1867). But the most important heraldic work of modern times is Siebmacher's *Grosses und allgemeines Wapenbuch*, begun by Von Hefner and continued by Grenser and others (Nuremberg); it is to consist of 160 parts, of which 113 had been published up to 1874.

HERAPATH, William, an English chemist, born in Bristol, May 26, 1796, died there, Feb. 6, 1868. His father was a brewer, and William succeeded to the business. From the study of chemistry in its application to brewing he turned his attention to that of the science in general. His first paper, "On the Specific Gravity of the Metallic Oxides," was published in the "Philosophical Magazine." He was one of the founders of the London chemical society, and was elected in 1828 professor of chemistry in the Bristol medical school. He retired from the business of brewing in 1830, and in connection with his professorship was employed in making chemical analyses. He was eminent in toxicology.

HERAT, or **Herant**, a city of Afghanistan, on the Heri, 360 m. W. of Cabool, and 190 m. S. E. of Meshed; pop. about 50,000. It is situated in a plain 2,500 ft. above the level of the sea, and is strongly fortified. The streets are ill built, narrow, and dirty. The principal public edifices are the citadel, mosques, bazaars, caravansaries, baths, and the palace of the khan. It is divided by four bazaars, which run from four gates, and one of which is 1,300

yards long and roofed with arched brickwork. The staple articles of commerce are saffron and asafetida, and the manufactures include carpets, cloaks, caps, shoes, saddlery, harness, sabres, and dressed sheep skins. Herat is a place of great military and commercial importance, being the N. W. "gate of India," and the point where the shawls, chintzes, muslins, indigo, &c., of India and Afghanistan are exchanged for the products of China, Russia, Turkey, and Persia.—At the close of the 18th century Herat belonged to the dominions of Zemaun Shah, the sovereign of Afghanistan. But there were two rival families in the state—that of the king, of the Süddosi tribe, and that of Futteh Khan and his 20 brothers, of whom Dost Mohammed was one of the youngest. The family of Futteh Khan eventually triumphed over their rivals, and divided Afghanistan among themselves, except Herat, which remained in the hands of the brother

government and the dictatorial attitude of the Persian shah fomented discord, in consequence of which Yusuf was driven from power by Esa Khan, who usurped it. The Persians then besieged the town, and captured it, Oct. 26, 1856. This led to war between Persia and England, since the latter government looked upon the capture of Herat as a breach of the treaty of 1853. The Persians were defeated on several occasions, and compelled to sign a treaty at Teheran, April 14, 1857, by which the shah renounced all claims on Herat; but he installed Ahmed Khan as its ruler, who was recognized by the British government. Soon afterward this ruler captured Furrah, which the amir of Cabool quickly recaptured, and then laid siege to Herat. After holding out 10 months, the city was taken by storm, May 26, 1863. It has since been reannexed to the Afghan dominions. The struggle of Russia and Great Britain for the ascendancy in



The Citadel, Herat.

of Zemaun Shah. In 1837, under the viceroyship of Yar Mohammed, the Persians appeared before Herat and subjected it to one of the most memorable sieges in modern times, lasting from Nov. 22, 1837, to Sept. 9, 1838, which the town was able to resist in consequence of the exertions of Lieut. Pottinger of the Bombay artillery. In May, 1843, when Kamran, the chieftain of Herat, died, Yar Mohammed made himself master of the town, to the exclusion of Kamran's son. At his death in 1851 he transmitted his power to his son Mohammed Said, whose conduct became so unsatisfactory that, with the consent of the people and the military assistance of the shah of Persia, he was supplanted by Yusuf, a prince of the Süddosi family, who in 1855 captured Herat and proclaimed himself chief as the vassal of Persia. He acted under Russian and was opposed to English influence. The proposed expulsion of an agent of the English

central Asia has given to Herat an even greater political importance than it had before.

HÉRAULT, a S. department of France, in Languedoc, bordering on the Mediterranean, and on the departments of Gard, Aveyron, Tarn, and Aude; area, 2,293 sq. m.; pop. in 1872, 429,878. The surface is mountainous in the north, but in the south are plains, which slope to the sea. Between the mountains and the plains there runs from E. to W., through the entire length of the department, a band of stony earth which allows of no cultivation

but that of the olive and the vine. The principal river is the Hérault, which flows nearly S. through the department to the Mediterranean at Agde. There are several canals. The climate is dry and very warm, and, except near the marshes on the S. coast, healthy. Olives and grapes are the chief agricultural products. Excellent white and red wines are made. Brandies, cloths, woollens, silks, liqueurs, perfumes, paper, pottery, and candles are manufactured; there are mines of iron, copper, and coal, and marble quarries. It is divided into the arrondissements of Béziers, Lodève, Montpellier, and St. Pons. Capital, Montpellier.

HÉRAULT DE SÈCHELLES, *Marie Jean*, a French revolutionist, born in Paris in 1760, guillotined there, April 5, 1794. He was a lawyer, and was advocate general at the Châtelet. When the revolution broke out he embraced its principles with ardor, and distinguished himself by personal bravery at the siege of the Bastille. In

September, 1791, he was elected by the city of Paris to the legislative assembly, where he at once joined the extreme left. Having been returned to the convention by the department of Seine-et-Oise, he was chosen president of that body, Nov. 2, 1792. He was one of the commissioners sent to organize the department of Mont Blanc, and while absent from Paris on this mission signed a letter voting for the "condemnation" of the king, after the words "to death" had been stricken from it at the request of one of his colleagues, the abbé Grégoire. He joined Danton and Lacroix in demanding the trial of Henriot, and presided at the well known sitting of June 2, 1793, when he proclaimed the proscription of the Girondists. On June 10 he presented a report from the committee of public safety on the proposed constitution, which had been drawn up mainly by himself, but it was not accepted. He also presided at the great *fête* of Aug. 10, 1793. He was an uncompromising democrat, and as member of the committee of public safety proposed many measures of great severity. When sent on a mission to Alsace in September, 1793, he wrote: "I have planted guillotines on my route, and find that they have produced good effects." The consideration he enjoyed provoked the jealousy of Robespierre, and on a frivolous pretext he was imprisoned. On March 31, 1794, St. Just accused him in the convention of being a noble by birth and of having protected the *émigrés*. He was condemned to death with Danton, Desmoulins, and others, and met his fate with calmness. He was the author of many works, among which were *Visite à Buffon* (Paris, 1785), and *Théorie de l'ambition* (1802), written during his last imprisonment.

HERBARIUM, a collection of dried plants, formerly called a *hortus siccus*. In collecting specimens, the whole plant, including root, is taken if not over 15 in. high, if possible selecting those which present both flower and fruit. With larger plants such portions are taken as will accurately represent the whole; if the leaves vary in form, specimens of each kind should be included, as well as young shoots, buds, flowers, and fruit. The specimens are dried between sheets of bibulous paper, which are changed more or less frequently according to the climate and the character of the plants. When thoroughly dry, the flowers and soft parts are poisoned, to prevent their destruction by insects, by sprinkling them with an alcoholic solution of corrosive sublimate and keeping them between papers until this is dry. The specimens are finally mounted upon sheets of heavy white paper by gluing them down, or by fastening them by means of small straps of gummed paper; one species only is placed upon a sheet, but several small specimens of the same species in different stages, or from different localities, are put upon the same sheet. The name of the plant is written at the lower right-hand

corner, or a ticket containing it is pasted there. The species of each genus are placed together in a fold of heavy manila paper, upon the lower left-hand corner of which the name of the genus is written. The specimens in their genus covers are then placed in a cabinet or case with pigeonholes large enough to allow them to lie flat, which should close tightly to exclude dust and insects. The genera are gathered into families or orders, following whatever lineal arrangement may be preferred. The size of the paper is a matter of importance; great annoyance results from having it too small, and if needlessly large it increases the expense. Most American botanists adopt the size of 11½ by 16½ in.; the herbarium of Linnæus is on ordinary foolscap sheets. Among the celebrated collections of Europe are the Kew, the Linnæan, and the Banksian herbaria, the last at the British museum. The herbaria of the Paris museum, of Berlin, of St. Petersburg, and many others, are of great extent and value. In this country, the Gray herbarium at Harvard, the Torrey and Meisner herbaria at Columbia college, and that of the academy of natural sciences at Philadelphia, are the most important; and there are many smaller ones, including those of botanists who study in special departments, of great scientific interest.

HERBART, Johann Friedrich, a German philosopher, born in Oldenburg, May 4, 1776, died in Göttingen, Aug. 14, 1841. At an early age he acquired a knowledge of the philosophical systems of Wolf and Kant, and subsequently attended the lectures of Fichte at Jena. After teaching at Bern, where he was intimate with Pestalozzi, and wrote a treatise on his system of education, he went in 1802 to Göttingen, and in 1805 was appointed extraordinary professor. In 1809 he accepted the chair of philosophy at Königsberg, whence he was recalled in 1833 to Göttingen. His philosophy was a reaction against the reigning idealism, and partakes at once of the empiricism of Locke and Condillac, the monadism of Leibnitz, the criticism of Kant, and the mathematical idealism of Bardili. His principal works are: *Lehrbuch zur Einleitung in die Philosophie* (Königsberg, 1813; 4th ed., 1837); *Lehrbuch zur Psychologie* (1816; 3d ed., 1834); *Psychologie, als Wissenschaft neu gegründet auf Erfahrung, Metaphysik und Mathematik* (2 vols., 1824-'5); *Allgemeine Metaphysik nebst den Anfängen der philosophischen Naturlehre* (2 vols., 1828-'9); and the *Encyclopädie der Philosophie aus praktischen Gesichtspunkten* (Halle, 1831; 2d ed., 1841). His minor philosophical writings, with a biography by Hartenstein, were published at Leipsic (3 vols., 1841-'3); his complete works were edited by Hartenstein (12 vols., Leipsic, 1850-'52).

HERBELOT, Barthélemy d', a French orientalist, born in Paris in December, 1625, died there, Dec. 8, 1695. He acquired a knowledge of Hebrew, Arabic, Syriac, Persian, and Turkish, twice visited Italy to obtain instruction from

the orientals who frequented Genoa, Leghorn, and Venice, and in the last years of his life he was professor of Syriac at the collège de France. He left several inedited works, of which the *Bibliothèque orientale, ou Dictionnaire universel, contenant tout ce qui fait connaître les peuples de l'Orient* (fol.), was published in Paris two years after his death.

HERBERT, Edward, Baron Herbert of Cherbury, an English philosopher, born at Montgomery, Wales, in 1581, died in London, Aug. 20, 1648. He was married at 15, completed his education at Oxford, and in 1600 went to London. In 1608 he visited France. In 1610 he joined the English auxiliaries in the Netherlands under the command of Maurice of Nassau, prince of Orange, and served in the siege of Jülich. In 1614, under the same commander, he served in a second campaign against the Spaniards. He distinguished himself in these wars by great intrepidity. He then went to Italy, where the duke of Savoy intrusted him with the guidance of 4,000 Languedoc Protestants into Piedmont. In 1618 he was appointed by King James ambassador extraordinary to France, to renew the alliance between France and England. Very sensitive on all points of honor, he was involved in many duels, and especially offended the duke de Luynes, a favorite of the king, at whose instigation he was recalled to England. On the death of De Luynes (1621) he was sent again to France, and while there published his first work, *Tractatus de Veritate* (Paris, 1624). In 1625 he returned to England, and was created baron of Castle Island in the peerage of Ireland, and from this time devoted himself entirely to the duties of his station and to literature. In 1631 he was elevated to the English peerage, under the title of Baron Herbert of Cherbury. He was opposed to Bacon and Hobbes, and taught that human knowledge is derived from a *rationalis instinctus* or instinct of the reason, and that by the action of outward objects upon the mind certain *communes notions* or universal principles are educed. He believed that religion rests upon innate ideas, man's own consciousness being the standard by which revealed religion should be tested. In the disturbances in the reign of Charles I. he sided first with the parliament, and afterward with the king. Among his works are the following, all of which appeared after his death: *De Religione Gentilium, Errorumque apud eos Causis; Expositio (Buckinghami Ducis) in Ream Insulam*; and the "Life and Reign of King Henry VIII." His autobiography was printed by Horace Walpole in 1764.—See *Lord Herbert de Cherbury*, by Charles de Rémusat (Paris, 1874).

HERBERT, George, an English poet, fifth brother of the preceding, born at Montgomery castle, Wales, April 3, 1593, died at Bemerton, England, in February, 1632. He was educated at Westminster and at Trinity college, Cambridge, elected fellow of the college in 1615, and in 1619 public orator, which in

those days was a great honor. King James, whose favor he had gained by an elegant letter to him in Latin, presented him with a sinecure office worth £120 a year. The death of two of his most powerful friends, the duke of Richmond and the marquis of Hamilton, soon followed by that of the king, induced him to take holy orders, and he was made by Bishop Williams prebendary of Leighton Bromswold, or Layton Ecclesia, in 1626. In 1630 Charles I. presented him with the living of Bemerton, near Salisbury, and here he remained till his death. As a pastor he was most exemplary and zealous, and he was generally known as "holy George Herbert." His verses are quaint and full of imagery, with many beautiful thoughts and holy precepts. They are of the same school as those of Quarles and Donne. Herbert was the intimate friend of Sir Henry Wotton, Dr. Donne, and Lord Bacon. His principal works are: "The Temple, Sacred Poems and Private Ejaculations" (Cambridge, 1633); "Outlandish Proverbs, Sentences, &c." (London, 1640); "Quadripartit Devotions" (1647); "The Priest to the Temple, or the Character of a Country Parson" (1652); and "Remains," prose writings (1652). His life was written by Izaak Walton.

HERBERT, Henry William, an American author, born in London, April 7, 1807, died by his own hand in New York, May 17, 1858. He was a son of the Hon. and Rev. William Herbert, dean of Manchester, and graduated at Caius college, Cambridge, in 1828. He came to New York in 1831, and until 1839 was teacher of Greek in a private school. During this time he began to write for the public, and from 1833 to 1836 was editor of the "American Monthly Magazine," at one time in connection with C. F. Hoffman. In 1834 he published his first historical novel, "The Brothers, a Tale of the Fronde," followed by "Cromwell" (1837), "Marmaduke Wyvil" (1843), "The Roman Traitor" (1848), "The Miller of Martigny," "Guarica, or the Carib Bride," "Sherwood Forest, or Wager of Battle" (1855), and others. His historical works were "The Captains of the Greek Republics," "The Captains of the Roman Republic," "Henry VIII. and his Six Wives," and "The Royal Maries of Mediæval History." Some of these enjoyed in their time great popularity. For several years previous to his death Mr. Herbert resided near Newark, N. J. He made versions of several French romances, of Weiss's "Protestant Refugees" (New York, 1854), of the "Prometheus" and "Agamemnon" of Æschylus, and of poetry from French and Italian authors. His most celebrated and characteristic works, however, were on sporting, published under the pseudonyme of Frank Forester, namely: "The Field Sports of the United States and British Provinces" (1849); "Frank Forester and his Friends" (London, 1849); "The Fish and Fishing of the United States," &c. (New York, 1850); "Young Sportsman's

Complete Manual;" "The Horse and Horsemanship of the United States and British Provinces of North America" (2 vols. 4to, 1857); and "American Game." Mr. Herbert also edited various works, and was a versatile contributor to literary magazines and journals. As a writer on field sports he was the first in America to give prominence to a department of literature which has of late years become both copious and popular.

HERBERT, John Rogers, an English painter, born in Maldon, Essex, Jan. 23, 1810. He became a student in the royal academy while a boy, and before the age of 24 had acquired considerable reputation. About 1839 he became a convert to the Roman Catholic church. He was employed on the decoration of the new houses of parliament, and among his frescoes there are nine subjects taken from the Old Testament in illustration of justice on earth and its development in law and judgment. Since the death of his son in 1856, a young painter of great promise, his subjects have been almost entirely religious. He was elected associate of the royal academy in 1841 and academician in 1846.

HERBERT, Sir Thomas, an English traveller, born in York about 1606, died there in 1682. He studied at Oxford and Cambridge, and in 1626 accompanied Sir Dodmore Cotton on his embassy to Persia. He returned to England at the end of four years, after having visited Persia, northern Africa, and the East Indies, and in 1634 published "Some Yeares Travels into Africa and the Great Asia, especially the Territories of the Persian Monarchy." In the civil war Herbert took the side of the parliament, was one of the commissioners of Halifax, and was sent by parliament among the deputies to Newcastle to receive the king from the Scotch. Charles was so won by his kind and courteous behavior that, though he was a Presbyterian, he retained him to the last, after his other attendants had been dismissed. Herbert, for his services to the king, was rewarded by Charles II. with the title of baronet. Together with some others, he wrote the *Threnodia Carolina*, an account of the last two years of the life of Charles I. (1678 and 1813).

HERBERT, William, third earl of Pembroke, an English poet, born at Wilton, Wiltshire, April 8, 1580, died in London, April 10, 1630. He was chancellor of the university of Oxford, a knight of the garter, for some time governor

of Portsmouth and lord chamberlain of the royal household, a contributor to the Bodleian library of valuable Greek MSS., and gave his name to Pembroke college, Oxford. He wrote poems of little merit, and some of a licentious character, but great interest is attached to his name on account of the supposition that he was the W. H. of Shakespeare's sonnets. Hallam, in his "Literature of Europe," favors this belief. Herbert, whose character is drawn by Clarendon in his "History of the Rebellion," was learned, noble, gallant, and licentious.

HERBIVORA (plant-eaters), an order of mammals, ungulate or hoofed, having molar teeth for grinding, and no clavicles. Owen divides them into: 1. Artiodactyls, or even-toed, with 19 dorso-lumbar vertebrae, and horns, if any, in pairs; including ruminants, two-toed, which chew the cud, as the cow, sheep, and camel; and omnivores, four-toed, like the hog. 2. Perissodactyls, odd-toed, one, three, or five, with more than 19 dorso-lumbar vertebrae, and horns, when any, never in pairs; including the solid-ungulates or solid-hoofed, one-toed, like the horse, ass, and hipparion; multungulates, three or five-toed, like the tapir, rhinoceros, and palæotherium; and proboscidea, like the elephant and mastodon, with five toes, a proboscis, and tusks in one or both jaws. They form one of the three orders of the eighth class, or mammals, in Prof. Agassiz's classification, the other two being marsupials and carnivora; of course, thus including rodents, many edentates, bats, and monkeys. This extension of the term is likely to introduce confusion into the generally followed classifications.

HERCULANEUM, an ancient city of Campania, Italy, situated at the N. W. base of Mt. Vesuvius, about 5 m. S. E. of Naples, and entirely



Herculaneum.

overwhelmed by an eruption of Vesuvius in A. D. 79. Its foundation was ascribed to Hercules, and Ovid called it *Herculeia urbs*. It is said by Strabo to have been occupied in turn

by Oscans, Pelasgians, Tyrrhenians, and Samnites, but its history is obscure, and it was never of great importance. The inscriptions show that under the Romans it had the rights of a *municipium*, and that it was governed with its own laws by demarchs and archons. Strabo describes it as situated on a projecting headland, and Sisenna as built on elevated ground between two rivers, and surrounded by low walls. Its healthy situation rendered it a place of resort for wealthy Romans, who built magnificent villas in the city and its suburbs. It suffered severely from an earthquake in A. D. 63, and Seneca said then that what remained was not safe. In August, 79, Vesuvius threw out for eight days and nights torrents of mud, filling the city to the roofs of the houses, and afterward showers of ashes and currents of lava, forming a deposit varying from 70 to 112 ft. in depth. A second settlement formed near the site of the buried city met with a similar fate in 472. Thereafter even the situation of Herculaneum was forgotten. It was not mentioned except in a few works of the 15th, 16th, and 17th centuries, and was supposed to be buried under the modern site of Torre del Greco. The discovery of the real site was due to the sinking of a well at Resina in 1709, which brought to light some fragments of mosaic and statues. For the history of the excavations, see POMPEII.

HERCULES (Gr. Ἡρακλῆς), the most renowned of the mythical heroes of antiquity, son of Jupiter by Alcmena, the granddaughter of Perseus. He was destined by Jupiter to occupy the throne of Perseus, but by the contrivance of Juno was superseded by Eurystheus, the grandson of that hero. His name originally was Alcides or Alcæus; it was changed to Hercules by the Delphic oracle, which ordered him to live at Tiryns and serve Eurystheus 12 years. When Jupiter saw that Juno had accomplished the disinheritance of Hercules, he made her promise that Hercules should become immortal on the completion of 12 great works for Eurystheus. There is some difference in the accounts of these labors, but the most common enumeration is the following: 1. The fight with the Nemean lion. The valley of Nemea between Cleonæ and Phlius was infested by a monstrous lion. Hercules blocked up one of the entrances to the den, entered it by the other, strangled the lion, and brought the carcass to Eurystheus. 2. The fight with the Lernaean hydra. In the district of Lernæ, near Argos, dwelt a huge hydra having nine heads, the middle one immortal. Hercules, having roused the hydra from its lair, cut off its heads, but in place of every head cut off two new ones sprang up. With the assistance of his servant Iolaus, he burned the mortal heads, and buried the immortal one under a rock. 3. The capture of the Arcadian stag. This animal had golden horns and brazen feet, and was of surpassing swiftness. Hercules was ordered to bring it alive to Mycenæ. For a whole year

he pursued it in vain. At length, weary of pursuing, the hero wounded it with an arrow, caught it, and carried it to Mycenæ. 4. The hunt of the Erymanthian boar. This boar had descended from Mt. Erymanthus into Psophis, and Hercules was ordered to bring him alive to Eurystheus. He chased the brute through the deep snow till, having tired him down, he caught him in a net. 5. The cleansing of the Augean stables. Augeas, king of Elis, had a herd of 3,000 oxen, whose stalls had not been cleansed for 30 years. Eurystheus commanded Hercules to clean them in one day. He accomplished it by turning the rivers Alpheus and Peneus through the stables. 6. The destruction of the Stymphalian birds, an innumerable swarm of voracious creatures, with claws, wings, and beaks of brass, that used their feathers as arrows and fed upon human flesh. They had taken refuge in a lake near Stymphalus, whence Hercules startled them with a rattle, and killed them with his arrows as they attempted to fly away. 7. The capture of the Cretan bull. This bull was a sacrificial gift from Neptune to Minos; but as Minos neglected to sacrifice him, Neptune caused the bull to go mad, and to make great havoc in Crete. Hercules was commanded to catch him, and bring him to Mycenæ. He did so, but then set the animal free to the great terror of Greece. 8. The abduction of the mares of Diomedes, a Thracian prince who fed them with human flesh. Eurystheus sent Hercules to bring them to him. Hercules had conducted them to the seacoast, when he was overtaken and attacked. He vanquished the Thracians, slew Diomedes, and cast his body to the mares, which became tame after eating the flesh of their master. Hercules then embarked with them, and brought them to Eurystheus. 9. The seizure of the girdle of Hippolyte, queen of the Amazons, which she had received from Mars. Hercules set sail from the Peloponnesus, and landed at Themiscyra, where he was hospitably entertained by Hippolyte, who promised him the girdle. But the malignity of Juno rousing the Amazons against him, he, deeming the queen a party to the conspiracy, slew her, possessed himself of her girdle, and arrived with it in safety at Mycenæ. 10. The capture of the oxen of Geryones, a monster who lived in the island of Erythia, and who had a herd of red oxen which fed with those of Helios, and were guarded by the giant Eurytion and the two-headed dog Orthrus. Erythia was in the ocean far to the west, and in his journey to it Hercules erected the pillars of Calpe and Abyla, hence called the pillars of Hercules. He killed Orthrus, Eurytion, and Geryones, and, after overcoming the efforts of gods and men to deprive him of them, brought the oxen to Eurystheus. 11. The getting of the golden apples of the Hesperides. These apples had been presented by Terra to Juno, by whom they had been intrusted to the keeping of the Hesperides and the dragon Ladon, in some

remote region of the west. Hercules, with the aid of Atlas, obtained the apples, which on his return he gave to Eurystheus. 12. The seizure of Cerberus, the dog that guarded the entrance to Hades. On arriving in Hades, Hercules asked permission of Pluto to take Cerberus, and the god yielded his assent, provided he could do so without having recourse to arms. Seizing Cerberus, Hercules bore him to the upper world, showed him to Eurystheus, and immediately carried the monster back to Hades.—In the original legends, Hercules figures as a mighty chieftain, who subdues Troy, and wages successful war against Argos and Lacedæmon; who dethrones princes, and gives away kingdoms and sceptres. The worship of Hercules prevailed especially among the Dorians; and the sacrifices offered to him were chiefly bulls, boars, rams, and lambs. He was also worshipped at Rome, and, under various names, in many other parts of the ancient world. In works of art he is represented in all the various stages of life; but whether he appears as a child, a hero, or a celestial, his character is always that of supernatural strength and energy. He is most frequently represented clothed in a lion's skin and carrying a club.

HERCULES' CLUB, a trivial name for three widely different plants: 1. *Xanthoxylum clava-Herculis*, a large West Indian tree of the same genus with our prickly ash; its smaller branches, thickly covered with short, straight, persistent prickles, are often made into walking canes. 2. A remarkable variety of the common gourd, *lagenaria vulgaris*, the fruit of which often exceeds 5 ft. in length; its greatest diameter is 4 or 5 in., and it is quite small near the stem. 3. *Aralia spinosa*, a large native shrub with an exceedingly prickly stem, also called angelica tree, and frequently cultivated on account of the tropical character of its foliage.

HERCYNIA SILVA, the ancient name of a forest of Germany, covering a mountain range whose position and extent are very differently described by various writers. It probably comprised the whole mountain system of central Europe, extending from the sources of the Danube to Transylvania, and thus including the Hartz, which seems to have retained a trace of the ancient name. The term Hercynian Forest was afterward restricted to the ranges which connect the Thuringian Forest with the Carpathians.

HERDER, Johann Gottfried von, a German author, born at Mohrungen, Aug. 25, 1744, died in Weimar, Dec. 18, 1803. He was the son of a schoolmaster and chorister, and became the amanuensis of a clergyman named Trescho, under whom he made wonderful progress in study and various reading. At the age of 18 his philosophical and literary erudition gained him the friendship of a Russian physician, who sent him to Königsberg, whence he was to go to St. Petersburg as a lecturer on surgery. But he renounced his intended profession after wit-

nessing a single operation, and devoted himself to theology. In 1765 he became a preacher at Riga, where the fervor and power of his discourses quickly made him an object of general enthusiasm. His *Fragmente über die neuere deutsche Literatur* (1767), and his *Kritische Wälder* (1769), were manifestoes against the artificial spirit and literature of his age, as compared with the grander inspirations of the early Orient and of ancient Greece. In 1769 he resigned his pastorate in order to travel in Germany, France, and Italy. At Strasburg he was intimately associated with Goethe. In 1771 he was called as court preacher to Bückeberg, and in 1776 was appointed court preacher and member of the consistory at Weimar. By his *Älteste Urkunde des menschlichen Geschlechts* (1774) he had already given a new impulse to theology by seeking poetic sentiments in religious traditions, and by tracing in the primitive world the sublime instincts of human nature and the foreshadowings of human destiny. At Weimar he passed the remainder of his life, in association with the leading minds in that most brilliant period of German literature, and occupied with constant labors in theology, poetry, and history. As a theologian he coöperated with Lessing in opposing the despotism of the letter and of dogmas, and brought the instincts of piety and of poetic fancy, illustrated by a wide erudition, rather than the dialectics of the schools, to bear upon the questions of religion. This tendency appears in his *Geist der Ebräischen Poesie* (Dessau, 1782; translated into English by Dr. James Marsh, 2 vols., Burlington, 1833), in which he treats the Hebrew writings as productions at once of primitive poetry and of religious inspiration. He translated many legends and songs from Arabian, Indian, Italian, Spanish, and ancient German poets, among which were the Spanish romances of the Cid. His most important work is the unfinished *Ideen zur Philosophie der Geschichte der Menschheit* (4 vols., Riga, 1784-'91; translated into English by T. Churchill, under the title of "Outlines of a Philosophy of the History of Man," 4to, London, 1800, and 2 vols. 8vo, 1803), which is one of the principal and standard treatises on the subject. He traces the course of humanity as of an individual placed on the earth by an unseen hand, changing its forms and objects as it passes from country to country and from age to age, protesting everywhere against the finite world which enchains it, seeking the triumph of the infinite, the victory of the soul, tending in spite of détours and through a series of revolutions to civilization, and preparing for the blossoming of life in another world. His numerous writings have been collected in 45 vols. (Stuttgart, 1806-'20), and in other editions, including one of his select works by H. Kurtz in 4 vols. (1871). A monument, with the inscription *Licht, Liebe, Leben*, was erected to his memory by Grand Duke Charles Augustus at Weimar in 1818. His biography was written

by his son E. G. von Herder (6 vols., Erlangen, 1846-'7). N. L. Frothingham has translated some of his poems into English. A complete edition of his works was published in 1872, under the patronage of the Prussian government.

HEREDITAMENTS, in law, whatever may be inherited. Hereditaments are corporeal, embracing lands and tenements of every description, and incorporeal, of which ten classes are usually enumerated: advowsons, tithes, commons, ways, offices, dignities, franchises, corodies or pensions, annuities, and rents. The first, second, and sixth do not exist in the United States, and the fifth is never the subject of inheritance here; but there are many easements that may be inheritable in connection with corporeal hereditaments to which they are appendant or appurtenant. In England there are also heirlooms which pass with the

realty to the heir, such as the family pictures, and by custom the furniture of the mansion house; but heirlooms are scarcely known to the law of America.

HEREFORD, a city and parliamentary and municipal borough of England, capital of Herefordshire, on the N. bank of the Wye, here crossed by a bridge of six arches, 136 m. by railway W. N. W. of London; pop. in 1871, 18,335. The principal building is the cathedral, refounded in 1079, of early Norman architecture, cruciform, with a frontage of 325 ft. and a breadth of 110 ft. The west front fell in 1786, and was rebuilt in an incongruous style, but the rest of the building has recently been restored in the best manner. It has many fine monuments, some as old as the 11th century, a chapter house, Lady chapel, cloisters, and a library containing valuable manuscripts,



Hereford Cathedral.

among them Wycliffe's Bible. Hereford is noted for its ancient charities, among which are 11 hospitals, or almshouses, which distribute money and bread. The manufactures are not important; they consist of gloves, once the staple industry, hats, flannels, leather, and cutlery. Iron works have been established since the opening of the railway to the coal district. Six fairs are held annually, the October fair being the largest in England for cattle and cheese. A musical festival is given triennially, in the cathedral, by the united choirs of Hereford, Worcester, and Gloucester. Hereford retains several of its ancient privileges.

HEREFORDSHIRE, an inland county of England, on the E. border of Wales, almost circular in shape; area, 835 sq. m.; pop. in 1871, 125,364. Its surface is diversified by hill and dale. It belongs wholly to the basin of the Severn, and has a gentle slope S. to that river,

into which flow its streams the Leddon, Lugg, Teme, Dore, Monnow, Arrow, Frome, and Wye, the last traversing the whole width of the county and famous for its beautiful scenery. Canals connect the towns of Hereford and Leominster with the Severn, and railways connect Hereford with Shrewsbury, Worcester, Abergavenny, and Brecon. The geological formation is old red sandstone, excepting in detached localities, where it is limestone. Iron ore, red and yellow ochres, pipe clay, and fullers' earth are found. Some medicinal and petrifying springs exist. This county is entirely agricultural, and formerly bore the name of "the garden of England." The soil is a deep, heavy, red loam, resting on clay or gravel, and very fertile. Wheat, barley, fruit, hops, and oak bark are the principal productions. The Hereford breed of cattle is famous for gentleness, beauty of appearance, and aptitude to fatten.

HERFORD, a town of Prussia, in the province of Westphalia, on the Werra and Aa and the Minden and Cologne railway, 46 m. E. N. E. of Münster; pop. in 1871, 10,968. It has a Roman Catholic and four Protestant churches and a synagogue. The Münsterkirche, a vast Romanesque building of the 13th century, was formerly attached to the monastery founded in 789, to which the town owes its origin, and of which the abbess was a princess of the empire. There are also a gymnasium and a museum for art and antiquities. Tobacco, linen, carpets, and leather are manufactured. At Engers, 5 m. E., is the tomb of Wittekind the Saxon.

HERING, Constantin, an American physician, born at Oschatz, Saxony, Jan. 1, 1800. He studied medicine in Leipsic, Dresden, and elsewhere in Germany, and in 1826 received the degree of doctor of medicine, surgery, and obstetrics. Subsequently he was sent on a scientific expedition to Dutch Guiana. In 1834 he settled in Philadelphia, where he has since for the most part resided. He has been connected with several medical reviews and journals of the homœopathic school, and is the author of a number of works devoted to the therapeutical reform commenced by Hahnemann, including "Rise and Progress of Homœopathy" (Philadelphia, 1834), which has been translated into several languages; "The Domestic Physician" (6th ed., Philadelphia, 1858); "American Drug Proverbs" (vol. i., Leipsic, 1853), &c. He has given much attention to cures for the bites of venomous reptiles and mad dogs. In 1874 he was preparing for publication a collection of his medical essays.

HERIOT, George, a Scottish goldsmith, the founder of Heriot's hospital, born in June, 1563, died in London, Feb. 12, 1624. As goldsmith to James I., he acquired a large fortune, and, having no direct heirs, bequeathed about £24,000 to the magistrates and clergy of Edinburgh, for the founding of a hospital there for the "maintenance, relief, bringing up, and education of poor and fatherless boys, free-men's sons of the city."

HERISAU, a town of Switzerland, capital of the half canton of Appenzell Outer Rhodes, 7 m. N. W. of Appenzell, on the right bank of the Glatt, about 2,500 ft. above the sea; pop. in 1870, 9,736. It consists of two principal squares and four streets, with seven smaller ones opening into them, and contains a large and handsome church, with a tower supposed to have been built in the 7th century, a new and elegant town house, a poorhouse, arsenal, and casino. There are extensive manufactures of muslins, plain and embroidered, and of cottons and silks, tanneries, dye works, bleach fields, and paper mills. The environs are laid out in beautiful walks and gardens, and the surrounding heights are crowned by the old castles of Rosenberg, Rosenberg, and Schwänenberg, while the baths of Heinrichsbad are about a mile distant.—Herisau was originally called Herginis Au. The Romans made a settlement

here and Christianity was introduced early in the 7th century. The nobles of Herisau established their jurisdiction here, which in 1390 fell under the abbey of St. Gall. The abbot taxed the people heavily and arbitrarily, and in 1463 they bought themselves free.

HERKIMER, a N. E. county of New York, intersected by the Mohawk river, and also drained by several mill streams; area, 1,745 sq. m.; pop. in 1870, 39,928. It has a hilly surface, in many places covered with a dense growth of timber, and containing limestone, building stone, lead, and gypsum. The soil is very fertile in the valleys, and even in some of the hilly districts. The Erie canal, the New York Central railroad, and the Adirondack railroad (in progress) traverse it. The chief productions in 1870 were 12,665 bushels of wheat, 128,953 of Indian corn, 551,179 of oats, 60,288 of barley, 41,806 of buckwheat, 367,805 of potatoes, 25,918 lbs. of wool, 444,910 of hops, 100,025 of flax, 1,212,051 of butter, 5,101,654 of cheese, and 157,839 tons of hay. There were 8,299 horses, 48,547 milch cows, 11,836 other cattle, 6,984 sheep, and 8,403 swine; 2 manufactories of agricultural implements, 72 of cheese, 24 of cheese boxes, 34 of carriages, 25 of clothing, 2 of cotton goods, 1 of firearms, 3 of hardware, 4 of malt, 1 of matches, 3 of printing paper, 1 of starch, 14 of tin, copper, and sheet-iron ware, 4 of woolen goods, 18 flour mills, 15 tanneries, 6 currying establishments, 5 planing mills, and 26 saw mills. Capital, Herkimer.

HERMANN. See ARMINIUS.

HERMANN, Johann Gottfried Jakob, a German philologist, born in Leipsic, Nov. 28, 1772, died Dec. 31, 1848. After studying law and philology at Leipsic and Jena, he began to lecture on ancient literature at Leipsic in 1794, and in 1798 was appointed extraordinary professor of philosophy. In 1803 he accepted the professorship of eloquence, and retained it until his death, together with that of poetry, which was united with it in 1809. He interested himself also in the Greek society which was founded in 1799, and in 1834 assumed the direction of the school of philology. His services to the cause of classical learning were very important. His researches were original, and their results were presented in his lectures with great vigor and clearness. He was particularly noted for the new principles which he developed in reference to the classical metres and the Greek grammar. His principal works in regard to the metres were: *De Metris Græcorum et Romanorum Poetarum* (Leipsic, 1796); *Handbuch der Metrik* (1798); *Elementa Doctrinæ Metricæ* (1816); *Epitome Doctrinæ Metricæ* (1818; 2d ed., 1844); and *De Metris Pindari*, in Heyne's edition of Pindar (3 vols., 1817). The principles which he applied in the grammar of the Greek language may be found in his treatise *De Emendanda Ratione Græcæ Grammaticæ* (1801), and in his annotations of Vigier's *De Græcæ Dictionis*

Idiotismis (1802; 4th ed., 1834) and *Libri IV de Particula æv* (1831). He also edited most of the plays of Euripides, the "Clouds" of Aristophanes, the "Trinummus" of Plautus, the "Poetics" of Aristotle, the hymns of Orpheus, and those ascribed to Homer, Bion, Moschus, and Æschylus, and completed the edition of Sophocles begun by Erfurdt. He discussed the significance of classical mythology in *De Mythologia Græcorum Antiquissima* (1807), and in *Briefe über Homer und Hesiodus*, written by him and Creuzer (Heidelberg, 1818). A collection of his essays was published under the title *Opuscula* (7 vols., 1827-'30).

HERMANNSTADT (Hung. *Nagy-Szeben*), a city of Transylvania, capital of the land of the Saxons, on the Zibin, 70 m. S. S. E. of Klausenburg; pop. in 1869, 18,998, of whom 69 per cent. were Germans. It consists of an upper and a lower town, and is surrounded by a wall

with five gates. The principal public edifices are the churches, the palace of Baron Brückenthal, a Lutheran and a Roman Catholic gymnasium, barracks, hospital, theatre, town hall, and government offices. The palace contains a picture gallery, a library, and a museum of Roman antiquities. The ramparts have been converted into fine promenades. There are considerable manufactures of linen and woollen, pottery, &c. Hermannstadt is the seat of the Lutheran chief consistory, and of a Greek bishop, the head of the Greek church of the Ruman nationality. It was founded in the 12th century by a German colony. In the course of the 15th and 16th centuries it was often besieged by the Turks, and was taken by them in 1536. At the beginning of the 17th century it was subjected to great calamities by Gabriel Batori. Several battles between the Austrians and the Hungarians under Bem were



Hermannstadt.

fought there at the beginning of 1849. In the early days of March the town was occupied by the Russians, but taken by Bem, March 11. A conflict between the Russians and Hungarians on July 20 resulted in the occupation of the town by the former on the following day, but on Aug. 4 Bem reconquered it. After the overthrow of the Hungarian revolution Hermannstadt was for a time the capital of Transylvania.

HERMAPHRODITE (Gr. *Ἑρμῆς*, Mercury, and *Ἀφροδίτη*, Venus), an animal or plant uniting in itself the sexual characters of the male and female. The name is derived from the fable of the union into one of the bodies of Hermaphroditus, son of Mercury and Venus, and the nymph Salmacis. There are two kinds of hermaphroditism, the spurious and the true; in the former there is only an appearance, from arrest or excess of development, of a union of opposite sexual characters; in the latter there is an actual coexistence in the same individual of more or less of both male and female organs. By far the largest number of cases of hermaphroditism, in man and the vertebrate

animals, belong to the first class. They are simply cases in which the individual is in reality exclusively male or female, but some of the accessory genital organs are so changed, either by excessive or deficient growth, or by change of position, as to resemble the corresponding parts in the opposite sex. In the second class of cases, where real male and female organs coexist upon the same individual, either one or the other set of organs is incomplete or imperfectly developed. According to the best authorities, no case has yet been known, in man or the higher animals, where the same individual presented simultaneously the complete male and female organizations. But true hermaphroditism is the normal type of sexual structure in almost all phanerogamic plants, the reproductive organs being either upon the same flower or upon different flowers on the same stock; and this condition is sometimes found as a monstrosity in dioecious plants. Perfect hermaphroditism exists also normally in many invertebrate animals, as, according to Siebold, in the *ctenophora* among *acalephæ*; the *cestodes* (tapeworms) and *trematodes* among

helminths; *planaria*; *hirudinei* (leeches) and *lumbricini* (earth worms) among annelids; some acephalous and cephalophorous mollusks; cirripeds among crustaceans; and the *tardigrada* among arachnoids. It does not exist in insects, unless as a monstrosity. In some of these, as in the *trematodes* and *planariae*, each individual may be self-impregnating, but generally the sexual act is accomplished by two individuals, respectively impregnating each other.

HERMAS, an ecclesiastical writer of the 1st century, author of the book *Pastor Hermæ*. He is thought by some to be the Hermas mentioned by St. Paul in Rom. xvi. 14. The Hermas of the epistle is a saint of the Roman calendar, whose feast is on May 9. The writer appears from intrinsic evidence to have been married and the father of a family. His book derives its title of "Shepherd" or Ποιμήν from the fact that the author in the second book introduces his guardian angel in the character of a shepherd. Irenæus cites the "Shepherd" under the title of "the Scripture;" Clement of Alexandria considers its revelations as divine; and Origen deems it an inspired book. It was very popular with Christians of the 2d and 3d centuries. Jerome accuses Hermas of foolishness in his commentary on Habakkuk; Tertullian designates his book as apocryphal. Duguet says it contains the germ of all heresies; and Mosheim calls its author an impostor. Of late years this book has been the subject of more editing and literary criticism than any other relic of the early church. It is supposed to have been originally written in Greek, but at present it exists entire only in a Latin version, which has been often published since the 16th century. It is inserted in Cotelier's *Patres Apostolici Ævi* (Paris, 1672), and in French in Desprez's *Bible* (Paris, 1715). A Greek version discovered in Ethiopia, and translated into Latin by D'Abbadie, was published in Leipsic in 1860. In 1857 a new Latin version from a manuscript discovered in Rome was edited at Leipsic by Dressel, together with a Greek text brought from Mount Athos by Simonides and revised by Tischendorf. The latter considers this Greek text a retranslation from the Latin; and in Dressel's *Patres Apostolici* (Leipsic, 1866) is a Greek text discovered by Tischendorf himself in the Sinaitic codex, and containing book i. of the "Shepherd" and the first four chapters of book ii. This is also given in Hilgenfeld's *Novum Testamentum extra Canonem receptum* (Leipsic, 1866). An English translation of Hilgenfeld's *Pastor Hermæ* is found in the "Ante-Nicene Christian Library" (Edinburgh, 1867).—Another HERMAS or HERMES, mentioned by St. Paul in the same verse, is held by the Greeks to have been one of the 70 disciples, and afterward bishop of Dalmatia. His feast in the eastern church occurs on April 8.

HERMES. See MERCURY.

HERMES, Georg, a German theologian, born at Dreyerwalde, Westphalia, April 22, 1775,

died in Bonn, May 26, 1831. He studied theology at the university of Münster, and in 1798 became teacher in the gymnasium of that city, and in 1807 professor of positive divinity at the university. Having closely studied Kant's philosophy, he occupied himself in refuting the doctrines of that philosopher so far as they were inconsistent with the Roman Catholic faith. When the Prussian government established the university of Bonn, Hermes in 1820 was appointed to the chair of Catholic theology. Here he began to found a speculative philosophic and dogmatic school in the church itself, delivering lectures aiming at an alliance between Protestants and Catholics, insisting that the difference between their views was not so great as is popularly supposed. He attempted to base the *Dogmatik* or positive theology of the Catholic church on speculative philosophy, founding a doctrine known as Hermesianism, and drew around him great numbers of followers. The philosophico-dogmatic method which Hermes advocated, as propounded in an "Introduction to the Catholic Christian Theology," insisted that the truth of Christian revelation and of the Catholic church should first be tested by reason, and that revelation should then be followed. Hermesianism was in fact a most ingenious effort to base the doctrines of the church on Kant's system of philosophy. It awoke powerful opposition, being condemned as heretical by a papal letter of Sept. 26, 1835. The Hermesians defended their orthodoxy vigorously; Braun, Achterfeld, Rosenbaum, and others appealing to the pope, but in vain.

HERMES TRISMEGISTUS, a mythical person, the reputed author of a great variety of works that were probably written by Egyptian Neo-Platonists. The Egyptian god Thoth (the intellect) was identified by the Greeks with Hermes (Mercury) as early as the time of Plato. In the conflict between Neo-Platonism and Christianity, the former sought to give a profounder and more spiritual meaning to the pagan philosophy, by combining the wisdom of the Egyptians and the Greeks, and representing it as a very ancient divine revelation. They therefore ascribed the authorship of the highest attainments of the human mind to Thoth or the Egyptian Hermes, regarded him as the source of all knowledge and inventions, the embodied Logos, thrice greatest (τρίς μέγιστος), from whose thoughts Pythagoras and Plato had derived their ideas, and whose works contained the sum total of human and divine wisdom. Clement of Alexandria mentions the contents of 42 books of Hermes which were extant in his time. Of those which now remain, some seem to have proceeded from the school of Philo, and others are much later and not unaffected by Christianity; some are written in a sober philosophical spirit, and others abound in fantastic astrological and thaumaturgical speculations. The most important is the *Pemander*, a dialogue on nature, the creation, the Deity, the soul, knowledge, and similar topics,

and interesting as showing the extent to which the combination of Platonic, Christian, oriental, and Jewish notions was carried. It was published in Greek and Latin by Bargicus (Paris, 1554), and by Rossett (Cologne, 1630). See Baumgarten-Crusius, *De Librorum Hermetlicorum Origine atque Indole* (Jena, 1827).

HERMIT. See ANCHORET.

HERMITAGE WINE. See FRANCE, WINES OF.

HERMON, a mountain, or rather a range of heights, on the northern border of Palestine, often spoken of in the Bible, forming the S. W. part of the Anti-Libanus. (See ANTI-LIBANUS.) The Psalms speak of the "dew of Hermon;" and travellers tell us that this is so abundant that their tents are wet with it, as if by a steady rain. Moses applies to this range the names both of Hermon and Sion, mentioning also its Emoritic name Senir, and the Sidonian Sirion.

HERMOPOLIS MAGNA, a city of ancient Egypt, on the left bank of the Nile, lat. 27° 45' N. It was the capital under the Greek rulers of a nome on the borders of Middle and Upper Egypt, and is sometimes classed in one and sometimes in the other division. It was a place of great opulence, ranking second to Thebes alone, and was famous for the worship of Typhon and of Thoth. Its name was derived from the latter divinity, who was supposed to correspond to the Greek Hermes. A little S. of it was the castle of Hermopolis, where vessels from the upper country paid toll. At the base of the Libyan hills, W. of the city, was the necropolis, where numerous mummies have been found. The Ptolemies erected many magnificent structures in Hermopolis, but there are now few remains. A part of the portico of the temple of Thoth was standing during the present century, but being of calcareous stone it was burned by the Turks for lime. The village of Ashmoonein or Eshmoon now occupies the southern extremity of the mounds on the site of Hermopolis. The principal occupation of the inhabitants, who number about 4,000, is excavating the mounds for nitre.

HERMOSILLO, an inland town of Mexico, in the state of Sonora, lat. 29° 20' N., and lon. 110° 40' W., 40 m. S. W. of Ures; pop. about 14,000, about 3,000 of whom are Yaqui Indians. It is situated in a sandy valley near the base of an isolated mountain, not far from the confluence of the Sonora and Horcasitas rivers. The streets are regular, and the houses built mostly of adobe, though a great many are of stone. The only public buildings are two churches and the mint, to which latter is attached an assay office. The climate is exceedingly hot, but the people are generally healthy. Mining was once extensively carried on, but the chief industry is now agriculture, wheat being the great staple production. Numerous flour mills in the town and vicinity form a striking feature of the place. The vine thrives well, and large quantities of brandy are manufactured. Hermosillo was formerly the seat

of the presidio of Pitic, and up to 1800 a military station. After the discovery of gold mines in Sonora the population grew rapidly, and Hermosillo is still the most important commercial entrepot of this part of the republic. Its port is Guaymas, about 100 m. S., on the gulf of California.

HERNANDO, a W. county of Florida, bordering on the gulf of Mexico, and bounded N. and E. by the Withlacoochee river; area, 1,980 sq. m.; pop. in 1870, 2,938, of whom 854 were colored. The surface is low and level, and mostly occupied by pine forests and swamps; the soil is sandy. The chief productions in 1870 were 41,354 bushels of Indian corn, 16,680 of sweet potatoes, 182 bales of cotton, 23 hogsheads of sugar, 6,356 gallons of molasses, and 34,682 lbs. of rice. There were 427 horses, 2,894 milch cows, 10,993 other cattle, and 5,711 swine. Capital, Brooksville.

HERNDON, William Lewis, an American naval officer, born in Fredericksburg, Va., Oct. 25, 1813, lost at sea, Sept. 12, 1857. He entered the navy at the age of 15, served in the Mexican war, and was engaged for three years in the national observatory at Washington. In 1851-'2 he explored the Amazon river under the direction of the United States government. The route selected by him was from Lima across the Cordillera eastward as far as Tarma, and thence N. to Tingo Maria on the Huallaga, whence by canoe he reached the great stream. During a portion of the journey he was accompanied by Lieut. Lardner Gibbon. A narrative of the expedition is contained in "Exploration of the Valley of the River Amazon," with maps and plates (2 vols., Washington, 1853-'4), the first part of which is by Herndon, and the second by Gibbon. In 1857 he was commander of the steamer Central America, which left Havana for New York on Sept. 8, having on board 474 passengers and a crew of 105, and about \$2,000,000 of gold. During a violent gale from the northeast and a heavy sea, on Sept. 11, she sprung a leak, and sank on the evening of Sept. 12, near the outer edge of the Gulf stream, in lat. 31° 44' N. All the women and children on board were put in the boats and saved, with a few men. Herndon and 426 others sank with the vessel.

HERNIA, or **Rupture,** the protrusion of any organ outside of its natural enclosing cavity, but, in common language, limited to the escape of the abdominal viscera. Until about the 18th century this disease was neglected by the profession, and its treatment was principally in the hands of itinerant quacks; but since then it has received the attention of the most eminent surgeons of all countries. According to the seat of the protrusion, the principal kinds of hernia are: the inguinal, which comes out at the abdominal rings, following the course of the spermatic cord in the male and of the round ligament in the female respectively into the scrotum and the greater labia; the femoral or crural, passing beneath Poupart's ligament, and

forming a tumor on the inner and upper part of the thigh; umbilical, in which the protrusion takes place at the navel or foetal opening of the umbilical cord; ventral, at the openings in the *linea alba* or *linea semilunares*; diaphragmatic, in which the abdominal organs pass into the cavity of the chest through some natural or abnormal opening in the diaphragm. All the abdominal viscera, except the duodenum, pancreas, and kidneys, may form part of the contents of a hernial tumor; but the floating portions of the small intestines (*jejunum* and *ileum*), the omentum, and the arch of the colon, are their most frequent constituents. Hernia rarely protrudes on the posterior and lateral portions of the abdomen, which are protected by thick muscles and firm unperforated aponeuroses, and where the organs are large and but little movable; the anterior abdominal wall, on the contrary, is thin, extensible, having weak points in the inguinal rings and canals, and freely floating organs always pressing upon its yielding tissues. A hernia is said to be reducible when the protruding organ may be returned into the abdomen; irreducible when it is not thus returnable; and strangulated when, owing to its unusually close constriction, the circulation of blood in its vessels, or the natural passage of the intestinal contents, is arrested. The sac of a hernia is a pouch of the reflected or parietal layer of the peritoneum, which is pushed forward in proportion to the escape of the viscera; external to this are the layers of fascia, muscles, and cellular tissue, varying in thickness according to the situation of the tumor. When we consider the yielding nature of the abdominal walls, their liability to pressure from muscular action, and the weak points inviting protrusion of the viscera, it is not surprising that hernia is so common; it has been estimated that in the male sex at least one in five is affected by it. The exciting causes are such as suddenly or violently compress the organs by action of the abdominal muscles, such as great bodily exertion, the lifting of heavy weights, violent vomiting, coughing, and sneezing; long continued efforts in parturition, defecation, or micturition; habitual compression by corsets, belts, bandages, and heavy hip-supported clothing; falls, improper gymnastic exercises and feats of strength, severe blows and contusions. A simple hernia, easily reducible and kept so by a proper truss, is rather an annoying infirmity than a positive disease, and is often susceptible of a radical cure.—The treatment of reducible hernia is to return it to the abdomen by a process called the *taxis*, and to retain it in place by a properly constructed and well fitting truss. Great care is necessary in the preparation of the truss; it should fit exactly, the springs should have the right bearings and pressure, and the pads the proper shape and consistency. Hernia may be rendered irreducible by adhesions of the sac to its contents, and of the latter to each other, or by enlargement of the contained

omentum from fatty deposition; the treatment is merely palliative, except in rare and favorable cases. Strangulated hernia may be produced by a sudden protrusion through a narrow aperture after violent exertion, by swelling or spasmodic action about the neck of the sac, distention of the intestine by flatus or fæces, and swelling and congestion of the omentum and mesentery; the stricture is generally at the neck of the sac. The indications of treatment are to reduce the hernial contents by the taxis, if possible, with the assistance of relaxation of the muscles by position, by bleeding, hot baths, narcotics, tobacco enemata, cold applications, and antimonial prostration, or, in modern times, by the inhalation of sulphuric ether and chloroform; if these fail, the sac must be cautiously opened, the stricture divided by the knife, and the hernia returned. Strangulated hernia is always a dangerous affection, and frequently fatal either in itself or from the effects of inflammation. Umbilical hernia, most common in new-born children, is treated on similar principles, by the reduction of the contents, and their retention by a special bandage. Diaphragmatic hernia, whether from congenital deficiency or accidental rupture of this partition, when strangulated, is difficult of diagnosis, and beyond the reach of operative surgery.

HERNICI, an ancient people of central Italy, often mentioned in the early history of Rome. They were of the Sabine race, and inhabited the Apennines of Latium between Lacus Fucinus (now Lake Celano) and the Trerus (Sacco), a tributary of the Liris (Garigliano). Their name is supposed to have signified "mountaineers." Their nearest neighbors were the Marsi, Æqui, and Volsci, whom they equalled in bravery, and like whom they obstinately resisted the growing power of Rome. In 486 B. C., however, they became the allies of the Romans, and 180 years later they were finally subdued by them. Anagnia (Anagni) was the chief town in their territory.

HERNÖSAND. See WESTER NÖRELAND.

HERO. See HERON.

HERO, in Greek mythology, a priestess of Venus at Sestos, beloved by Leander, a native of Abydos. Leander used to swim across the Hellespont nightly to visit his mistress; but one tempestuous night he was drowned, and in the morning the billows cast his body on the shore. When Hero beheld it she threw herself into the sea.

HEROD, surnamed the Great, king of the Jews, son of Antipater, a noble Idumæan, born in Ascalon, Judea, about 72 B. C., died in 4. When in 47 Julius Cæsar appointed his father procurator of Judea, the young Herod obtained the government of Galilee, and quickly vanquished the hordes of robbers which then infested the province. Alarming the ruling men at Jerusalem by his popularity, he was summoned before the sanhedrim on complaints of having put Jewish citizens to death without

trial. On the appointed day he appeared before the tribunal, gorgeously clad in purple, and surrounded by armed men; and though his acquittal was pronounced, he departed secretly to Syria, and was appointed governor of Coele-Syria in 46. After the death of Cæsar he favored Brutus and Cassius, and received the command of the army in Syria. He was equally successful in winning the support of Mark Antony, who entertained him at Rome in 40, and obtained from the senate a decree appointing him king of Judea. After the battle of Actium (31) and the death of Antony, he was confirmed in his kingdom by Augustus, whose favor he enjoyed during his reign. He had entered upon his government by besieging Jerusalem, and he hesitated at no crime or cruelty to establish his sovereignty. Hyrcanus, whom he feared as a competitor, was put to death on a charge of treason; his own wife Mariamne, to whom he was passionately attached, was executed (29); and her execution was followed by that of her two sons, and of her nearest relatives, and several of his principal counsellors. Yet his administration was vigorous and splendid, and for 30 years Judea was undisturbed by war, though its forces aided the Romans in Arabia and on the Bosphorus. He erected a marble temple at Paneas in honor of Augustus, restored the city of Samaria under the name of Sebaste, transformed a small town on the coast into the magnificent city of Cæsarea, erected temples and theatres, and an amphitheatre without the walls of Jerusalem, in which the Roman combats with wild beasts and gladiators were exhibited, sought to conciliate his subjects by many acts of munificence and liberality, and began to rebuild the temple of Jerusalem. In 18 he visited Rome, and was received with the greatest distinction by Augustus. The latter part of his reign was harassed by conspiracies and intrigues, and in his last illness, while a fearful disease was consuming his stomach and intestines, he ordered the execution of his son Antipas. To this illness is also referred the murder of the children in Bethlehem, an event recorded by the evangelist (Matt. ii. 16), but passed unnoticed by Josephus. His death occurred in the year which is generally considered by critics the year of the birth of Christ. Josephus is the principal authority for the events of his reign, which, notwithstanding its barbarities, restored to Jerusalem much of its earlier magnificence. He had ten wives, and partitioned his kingdom between three of his sons, Archelaus, Philip, and Herod Antipas.

HEROD AGRIPPA I., king of Judea and Chalcis, son of Aristobolus, and grandson of Herod the Great, born in the year 10 B. C., died A. D. 44. He was a favorite of his grandfather, who after the death of his father sent him to Rome, where he was educated. Caligula gave him the tetrarchy of Judea with the title of king (37). For services rendered, the emperor Claudius, after the banishment of Herod Anti-

pas, gave him all the provinces of ancient Judea and the kingdom of Chalcis, so that he became of a sudden one of the greatest princes of the East. A part of his history is written in the Acts of the Apostles (xii.). He governed much to the satisfaction of the Jews, and probably from a desire of pleasing the fanatical party, put to death the apostle James, and shut up Peter in prison. At Cæsarea, while he was giving games in honor of Claudius, the inhabitants of Tyre and Sidon waited on him, desiring peace. Arrayed in royal apparel, he sat on his throne and made an oration to them, and they glorified him as a god. He willingly received the impious flattery, but soon died miserably after a reign of seven years.

HEROD AGRIPPA II., a Jewish prince, son of the preceding, born about A. D. 27, died in 100. When his father died he was residing at the court of the emperor Claudius, who, instead of bestowing on him the dominions to which he was heir, detained him for four years at Rome. In 48 he received the small principality of Chalcis, to which additions were subsequently made. In 60 he went with his sister Berenice to Cæsarea to salute Festus on his accession to the government of Judea, and St. Paul, a prisoner there, stated his case before him. Before the rebellion of the Jews from the Romans, he sought to reconcile them, and during the war he sided with the Romans. After the capture and destruction of Jerusalem he retired with Berenice to Rome.

HEROD ANTIPAS, the son of Herod the Great and Malthace, a Samaritan, born in Jerusalem. His father gave the main parts of his kingdom to Archelaus, another son, and assigned to Antipas the tetrarchy of Galilee and Peræa. He first married the daughter of Aretas, king of Arabia Petraea, and afterward Herodias, the wife of his half brother Herod Philip, then living. This involved him in a war with Aretas, who invaded his territory, and was also the first step toward the indulgence of the passion which resulted in the imprisonment and beheading of John the Baptist. He built the city of Tiberias, and adorned and fortified many other places in his province. Having gone to Rome to solicit the title of king, he was banished to Gaul (A. D. 39) by Caligula, on suspicion of being concerned in the conspiracy of Sejanus, and died in Spain. It was before this Herod, who had come to Jerusalem to celebrate the passover, that Pilate sent Jesus, as a native of his tetrarchy (Luke xxiii.).

HERODES ATTICUS. See ATTICUS.

HERODIAN, a Greek writer on Roman history, supposed to have lived between A. D. 170 and 240. Nothing is known of his life, except that he resided for a long time in Italy. His work is entitled *Τῆς μετὰ Μάρκον Βασιλείας Ἰστορίων Βιβλία οκτώ*, and contains the history of the reigns between A. D. 180 and 238. His style is formed on that of Thucydides, and though his chronology and geography are sometimes inaccurate, his narrative is generally

clear and impartial. The best editions are those of Irmisch (5 vols., 1789-1805), F. A. Wolf (1792), and Bekker (1826).

HERODOTUS, a Greek historian, styled the father of history, born in Halicarnassus, Asia Minor, about 484 B. C., died probably in Thurii, Italy, about 420. The statement of Suidas that he belonged to an illustrious family is confirmed by the indications of wealth furnished by his high education and abundant means for frequent and distant travel. Suidas states further that he was exiled from Halicarnassus by Lygdamis, grandson of Artemisia, and that he took up his residence at Samos. He returned, however, to Halicarnassus about 455, and took part in the political movements which ended in the expulsion of the tyrant. He removed soon after to Athens. He visited Babylon, Arderieca near Susa, the remoter parts of Egypt, Cyrene, Colchis, Scythia, Thrace, Zante, Dodona, and Magna Græcia, thus ranging over a space more than 1,700 m. from E. to W. and 1,600 m. from N. to S. Within these limits his knowledge of scenery, cities, temples, manners and customs, and various wonders, is generally so minute and full that it could have been acquired only by a leisurely examination. In Egypt, for instance, he visited the great capitals Memphis and Heliopolis, the smaller towns, Sais, Bubastis, Buto, Papremis, Chemmis, Crocodilopolis, and Elephantine, the labyrinth, Lake Moeris, the line of the canal from the Arabian gulf to the Nile, the borders toward the desert of Sinai, and the whole region of the Delta. It is, related on uncertain authority that in 446 the Athenian assembly decreed a reward to him for his history, which he had read publicly; that he made known his work by recitation not only at Athens but in other cities, travelling from place to place as a sort of prose rhapsodist; and that at the recital of it before the collected Greeks at the great Olympian festival the young Thucydides was moved to tears. Herodotus while at Athens was at least acquainted with Thucydides, Sophocles, and some of the other intellectual lights that distinguished the age of Pericles, and it was doubtless from association with them in the centre of literary Hellas that he received the impulse to that wonderful elaboration of his work which he carried on for many years after his departure. Herodotus went about 440 to Thurii, a colony newly founded by the Athenians near the site of the former Sybaris, where he is said to have passed the remainder of his life. Suidas's statement that Herodotus lived for a while in Samos, and composed there some portions of his work, is quite probable; and from several passages in the work it appears that he left Thurii several times and went out on short voyages. At Thurii he is supposed to have applied himself only to the perfection of his history, retouching the narrative and interweaving parenthetical passages and accounts of later events. The abruptness of its close and occasional traces of incomplete-

ness indicate that, notwithstanding he had been constantly improving it, it was not entirely finished at his death. Many critics believe that he composed also the separate treatise on Assyrian history, to which he twice refers in his general history, but which has not been preserved. The time and place of his death are not altogether certain, his life being prolonged according to some to 394, and Pella and Athens, instead of Thurii, being made his abode in his latest years.—It is a question whether there were Greek histories in the century before Herodotus. Niebuhr absolutely denies the existence of any such works. What is more certain is, that before the work of Herodotus was written, there was no writing in Greece which could properly be called historical. Herodotus is habitually minute in referring to his authorities, but the only Greek with whose works he seems to have been familiar is Hecateus, who, however, can lay no claim to the title of a historian. The main subject of Herodotus's history is the Persian war of invasion, the contest which began with the expedition of Mardonius and terminated with the discomfiture of Xerxes. Yet he not only relates as an introduction the growth of the Persian empire and the previous hostilities between Greece and Persia, but takes every opportunity of diverging from his principal subject in order to introduce his various historical, geographical, and antiquarian knowledge. Thus he interweaves accounts of Croesus and of the Lydian kingdom, of the Babylonians and Assyrians, of the Egyptians, of the Greek colonies of northern Africa and the native Libyan races, of the Scythians and Hyperboreans, apropos of whom he gives an episode on universal geography. For the later and more important portion of his history, abundant living testimony was easily accessible to him, besides which there were in most of the countries monumental records of antiquity, and oral traditions even in Scythia and Libya. Thus in Greece more or less accurate lists of the kings, priests, and victors at the games were preserved in cities and sanctuaries, and dedicatory inscriptions on offerings in the temples; the Babylonians had sculptured documents, many of which have recently been discovered, tracing their history back for more than 2,000 years; the monuments of the Egyptians reached to a still earlier date; and in Persia there were not only memorials on pillars, tombs, and palaces, but more copious writings on parchment preserved in the archives of the empire. Herodotus was evidently unable to read or speak the Egyptian language, and was therefore dependent on his interpreters. In Egypt the priests took advantage of his ignorance to magnify the antiquity of their nation, to conceal from him their dark period of subjection under the invading shepherd kings, and to modify other inglorious portions of their history. In Babylon he probably obtained but little of his information from the Chaldean priestly caste, who possessed the most

exact and extensive knowledge; and though his accounts are correct in outline, they lack the fulness and precision of the narrative of the priest Berosus, who wrote more than a century later. Being born and bred in a Greek city subject to Persia, he doubtless came frequently into contact with Persian soldiers and officials, and he seems to have had access also to some of the most important documents in the royal archives, perhaps by means of Greek transcripts. His Persian history is, therefore, based in the main on authentic national records, diversified especially in the earlier part by circumstances and adventures from romantic chroniclers. Thus for the most important portions of his work Herodotus had more or less trustworthy monumental records; and his diligence, honesty, and impartiality in employing the materials that were open to him, have been generally admitted. His chief defect as a historian is an undue love of the marvellous; but he is truthful and accurate whenever he speaks from his own observation. The skill with which he has interwoven his episodes, and the prevailing idea of a divine Nemesis which he constantly presents, gives to his history the unity essential to a work of art. The peculiarity of his theory of divine retribution is, that he regards mere greatness and good fortune, apart from any impiety or arrogance, as provoking the envy of the gods. This theory was the great moral which he had drawn from his survey of mundane events; and perhaps the chief attraction of his main theme, and the principle which guided him in his choice of episodes, was that he might present signal illustrations of greatness laid low, of monarchs and patriots who gradually rose to the pinnacle of glory and prosperity only to experience a most calamitous reverse. The simple beauty of his style, the grandeur of his historical combinations, the amiability of his temper, and the entertainment which his narrative furnishes, have never been questioned, and he is esteemed by scholars the earliest and best of romantic historians.—The best editions are those of Schweighäuser (6 vols., Strasburg and Paris, 1806; reprinted in London, 1818), Gaisford (4 vols., Oxford, 1824), Bähr (4 vols., Leipsic, 1830-'35; new ed., 1855-'61), Abrecht (2d ed., Leipsic, 1869), Stein (3d ed., Berlin, 1870), and H. G. Woods (London, 1873). The best English translation is that of the Rev. G. Rawlinson, assisted by Sir Henry Rawlinson and Sir J. G. Wilkinson (4 vols., London, 1858-'60), with copious notes and appendices embodying the chief historical and ethnographical illustrations that have been obtained in the progress of cuneiform and hieroglyphical discovery. See also Büdinger, *Zur ägyptischen Forschung Herodots* (Vienna, 1873).

HEROLD, Louis Joseph Ferdinand, a French composer, born in Paris, Jan. 28, 1791, died at Ternes, near Paris, Jan. 18, 1838. He studied with Mehul, Adam, and Cherubini, and having procured the means for travel by a successful

competition for the prizes of the conservatory, passed five years in Italy. On his return to Paris in 1817 he wrote a number of works for the Opéra Comique, which were successful in their day, but are now mostly forgotten. *Zampa*, produced in 1831, placed him in the first rank of French composers. Incessant labor undermined his health, and after the production of the *Pré aux Clercs* and *La médecine sans médecin*, which were received with great favor, he died in the zenith of his fame. His later works are frequently performed, especially *Zampa*.

HERON, a wading bird of the family *ardeide*, and the old genus *ardea* (Linn.), including also the bitterns and egrets, treated under their own names. The bill is much longer than the head, rather slender, sharp, and straight, with an emargination at the tip; the wings are long, the first quill nearly as long as the second and third, which are equal and longest; the tail short and even, of 12 stiffened feathers; tarsi long and slender, transversely scaled in front; tibiae lengthened, bare for the lower third or half; outer toe longer than the inner, and united at the base to the middle one; hind toe long, on a level with the others; claws moderate, curved, and acute, the inner edge of the middle one pectinated. The body is rather compressed; the neck is very long, well feathered, and, by a beautiful arrangement in the cervical vertebrae, capable of being turned so that the head may be placed almost at a right angle with it; the bill is a formidable weapon. Herons are found in most parts of the world, migrating to the warmer regions as winter comes on; they are generally seen alone, standing in swamps, pools, and shallow rivers, waiting for their prey, with the long neck drawn down between the shoul-



European Heron (*Ardea cinerea*).

ders; but no sooner does a reptile or a fish appear than the bill is darted forth and the animal immediately swallowed. They do not seize fish with their feet; the serrated middle claw is for removing from the bill the sticky down which adheres to it after cleansing the

plumage.—The common heron of Europe (*A. cinerea*, Linn.), celebrated in old times as the bird which afforded the principal sport in falconry, is of a bluish ash color, with a black crest on the hind head, and the fore part of the neck white with black dots; the shoulder



Louisiana Heron (*Ardea Ludoviciana*).

of the wings and the primaries black; a naked space around the eyes. Its food consists of fish, frogs, aquatic insects and mollusks, mice, moles, and similar small animals. The nest is generally on a high tree in the vicinity of a river. The flight is sometimes very high, and is performed with the legs hanging behind, and the head and neck resting on the back. It makes at times a harsh and loud scream; when taken young, it becomes so far domesticated as to associate with domestic fowl; though a royal bird in respect to game, its flesh is unfit for food. It is distributed over most parts of the old world; among some eastern nations the crests of the males are highly esteemed as ornaments.—The purple heron of Europe (*A. purpurea*, Linn.) is very handsome, with the elegant shape of a heron and the rufous and purplish tints of the bitterns.—The Louisiana heron (*A. Ludoviciana*, Wils.; *demigretta*, Baird) is about 27 in. long, with an extent of wings of 3 ft.; the bill is very slender; the head with a long crest, the feathers, with those of the neck and upper back, lanceolate; like the egrets, it has the feathers of the lower back plumose and lengthened; the color above is slaty blue on the head, neck, and exposed upper parts; lower back, rump, under parts, and middle line of throat, white; occiput and back of neck purplish; bill brownish black above and at tip; the female is like the male. From its beauty of form and plumage and grace of motion, Audubon calls this heron the "lady of the waters;" it is found on the coast of the southern Atlantic and gulf states, never far inland; it keeps in company and sometimes breeds in the same

places with egrets and other herons; it is not very shy, and its flight is irregular and swifter than that of any other species. The nests are generally within a few feet of the ground, on low bushes, and very close to each other, made of small dried sticks crossed in various ways, flat, and each containing three eggs; these are about $1\frac{1}{2}$ by $1\frac{1}{2}$ in., nearly elliptical, of a pale greenish blue, thin, and smooth; the period of incubation is 21 days; as of most herons, the flesh of the young, before they leave the nest, is considered good eating.—The snowy heron (*A. candidissima*, Gmel.; genus *garzetta*, Bonap.) is about 23 in. long, with an extent of wings of 38 in.; the head is ornamented with a full occipital crest of feathers with hair-like webs, and similar plumes on the lower part of the throat; dorsal plumes reaching to the end of the tail. The color is pure white; the bill black, yellow at base; legs black. It is found on the coast of the middle and southern states, and across the continent to California; it is a constant resident in Florida and Louisiana, and is occasionally seen as far north as Massachusetts. They breed in large communities with other herons and with grackles, in a similar manner to the preceding species; the mangroves of Florida are favorite places for their nests; the eggs are three, about $1\frac{1}{2}$ by $1\frac{1}{2}$ in., broadly elliptical, and pale bluish green; both sexes incubate, and the young in Florida leave their nest about the middle of May, and a month or two later further north; both eggs and young are destroyed by crows and turkey buzzards. They resort to the borders of salt marshes, and feed on shrimps, small fish, crustaceans, snails, lizards, frogs, and aquatic insects; in the pursuit of their prey they run



Great Blue Heron (*Ardea herodias*).

quickly through the shallows, throwing up their wings in a rapid and graceful manner; when wounded they defend themselves with the bill with great courage.—The great blue heron (*A. herodias*, Linn.), generally called blue crane, is 4 ft. long to end of tail, with an extent of wings

of 6 ft., and the bill 5½ in. with a gape of 7½. The color above is bluish ash, with the edges of wings and tibiae rufous; neck cinnamon brown, head black, frontal patch white; below black, with broad white streaks on the belly; lower tail coverts white, middle line of throat the same with black and rufous streaks; bill greenish above, dusky yellow at the base; the quills black, and the tail bluish slate. There is considerable variation in size and plumage, according to age and habitat. It is found throughout the United States and the West Indies, but most abundantly in the low lands bordering on the Atlantic coast. It is one of the hardiest of the family, bearing the cold of a New England winter; it is exceedingly difficult to approach, from the acuteness of its hearing and vision, except in close woods; it feeds at all hours of the day, and even in clear nights. It begins to breed from the beginning of March to the middle of June, according to



Great White Heron (*Ardea occidentalis*).

latitude; during the love season they associate in pairs, being rather solitary at all other times; several pairs sometimes form a community, in swamps, pine barrens, and localities several miles from water, but especially in the vicinity of rice fields, and in the tops of cypress trees. The eggs, three in number, are 2½ by 1½ in., of a dull bluish white; the male and female sit alternately, feeding each other, and are remarkably affectionate to the young; the flesh of the young is tolerably good. Its food consists of fish, reptiles, birds, small quadrupeds, and large insects; it strikes its prey through the body, as near the head as possible, killing often by beating it against the ground; it is exceedingly voracious. This bird is capable of inflicting severe wounds with its bill, the more dangerous that it generally aims at the eyes; it has been seen to chase the fish hawk, and force it to yield up its prey. The flight is high, majestic, and long sustained. The weight of a full-grown bird is from 6 to 8 lbs.; the inter-

time is about 9 ft. long, not thicker than a swan's quill.—The great white heron (*A. occidentalis*, Aud.) is more than 4 ft. long, with an extent of wings of nearly 7; the bill 6 in.; the weight about 7 lbs. The color is pure white; the lengthened occipital feathers do not form a crest. It is found in southern Florida and in Cuba. This is the largest of the herons, and has the purest white plumage. It is very shy, breeding among the keys on the Florida coast, to which it resorts year after year; two nests are rarely seen near each other, though nests of other species are often on the same bush; it begins to lay about the 1st of February. It lays three eggs, 2½ by 1½ in., thick-shelled, of a plain light bluish green; both sexes incubate, for about 30 days. It is more solitary than the preceding species, except on the feeding grounds; the walk is majestic, and the flight firm and regular; the sand bars and flats on which they feed are often far from their roosting places, and are rarely left until the water reaches as high as their body; the position, when roosting, is generally on one foot. There is a great enmity between this and the preceding species, and the former will pursue, kill, and swallow the young of the latter whenever an opportunity offers, even though other favorite food be in abundance.—The blue heron (*A. cærulea*, Linn.; genus *florida*, Baird) is 22 in. long, with an extent of wings of 33; the bill is about 3 in., and the weight 9 oz. The bill is blue, slender, and very sharp; the prevailing tint of the bird is slate blue, with the head and neck bluish purple; legs black; the young are white, sometimes spotted with blue. The top of the head is moderately crested, and the scapulars greatly elongated. It is found in the southern Atlantic states and about the gulf of Mexico, and has been seen in New York; it associates with the white and Louisiana herons, roosting in the evergreens of the keys; it is very shy, and its flight is swifter than that of any except the *A. ludoviciana*. The eggs are 1½ by 1½ in., of the same color as those of the snowy heron.—The green heron has been alluded to under BITTERN. The sun herons of the warmer parts of South America belong to the genus *eurypyga* (Illiger), characterized by a long, slender, straight bill, bent and emarginated at the tip; long and ample wings; long, broad, and slightly rounded tail. The best known species (*E. helias*, Pall.) is about as large as a small grouse, with a long, thin neck, spreading tail, and comparatively short legs; the plumage is varied with bands and lines of brown, fulvous red, gray, and black, resembling the distribution of colors on some of the larger moths; it feeds on small fry and aquatic insects. It is called "little peacock" in Cayenne; its habits resemble those of the snipes more than of the herons. (See NIGHT HERON.)

HERON, or **Hero** (Gr. Ἡρώς), a philosopher and mathematician of Alexandria, who flourished in the latter part of the 3d century B. C. He was the inventor of several ingenious ma-

chines, among which are the fountain called by his name, in which a jet of water is kept playing by means of condensed air; a steam engine, on the principle of what is called Barker's mill, in which the boiler is caused to revolve round a vertical axis by jets of steam issuing from lateral holes in the arms with which it is provided; and a double forcing pump used for a fire engine. Heron wrote several works on mechanical and scientific subjects, of which only fragments remain; the most valuable is his *Πνευματικά*, or treatise on pneumatics, the best edition of which is that published at Paris in 1693, in the *Veterum Mathematicorum Opera*.

HEROPHILUS, a Greek anatomist, born at Chalcedon in Bithynia, flourished about 300 B. C. He lived at Alexandria, where he acquired great reputation both as a teacher and practitioner. He is generally thought to have been the first who actually studied and taught anatomy from the dissection of human bodies; and he no doubt practised this method to a far greater extent than had previously been done. His investigations in human anatomy were marked by so much originality and exactness, that a large number of the anatomical names now in use date from him. He first distinguished the nerves from the tendons, with which they had previously been confounded, and showed that they originate from the brain. He recognized the principal membranes of the brain and the eyeballs, and gave them their names of arachnoid, retina, &c. The confluence of the great longitudinal and lateral sinuses of the brain is still called the *torcular Herophili*; and the first division of the small intestine retains the designation, duodenum, which he gave to it. He is also said to have examined to some extent the internal organs, for the purpose of investigating the nature and cause of the disease which produced death; thus laying the foundation of the science of pathological anatomy, the study of which was recommenced by Morgagni, 2,000 years later. The original works of Herophilus have long been lost, with the exception of a few fragments, and are now known mainly through quotations by Galen and others.

HEROSTRATUS. See **EROSTRATUS**.

HERPETOLOGY (Gr. *ἑρπεύω*, reptile or creeping thing, and *λόγος*, discourse), the branch of zoology which treats of the structure and classification of reptiles. The present article will be confined to the last division, the first being more properly noticed under **REPTILES**. The Egyptian and other ancient authors knew well the distinctions between the four reptilian orders, generally called tortoises, lizards, serpents, and frogs; Aristotle described them as terrestrial, red-blooded animals, laying eggs, and with four or no feet, mentioning tortoises, frogs, crocodiles, lizards, and serpents, and indicating the first three as amphibians. Pliny, four centuries later, divided reptiles into terrestrial, aquatic, and aerial, but he has mostly

copied Aristotle, adding a great variety of fabulous stories whose influence has extended in the popular mind even to the present time. Gesner, in the 16th century, devoted a considerable part of his writings to the natural history of this class, illustrated with wood engravings, and conveniently arranged in alphabetical order. Aldrovandus, toward the end of the same century, wrote two books on serpents and lizards, compiling chiefly from the Greek and Arabian authors, and collected much information from the synonymy of reptiles, their symbolic history, and their uses in medicine. Ray published in London, in 1693, a synopsis of serpents, in which the manner of respiration, the size and color of the eggs, and similar characters, are made the basis of an unnatural classification.—Linnæus divided the class of reptiles into orders, genera, and species in his *Systema Naturæ*; calling them, however, *amphibia*, and characterizing them by the three principal marks of naked or scaly body, teeth sharp and without molars, and no fins with rays; he made two orders, serpents (without limbs) and reptiles (with limbs). In his third class, as given in Gmelin's edition of 1788, the order reptiles are those breathing by lungs, with four limbs, and a simple male sexual organ; serpents, on the other hand, have a rounded body without distinct neck, moving by its undulations, with dilatable and non-consolidated jaws, and without limbs, fins, or external ears. In the first order were four genera, the tortoise, dragon, lizard, and frog; and in the second, *crotalus*, *boa*, *coluber*, *anguis*, *amphisbæna*, and *cæcilia*, most of these genera being subdivided into numerous species. Laurenti, in 1768, published a synopsis of reptiles, very remarkable for the time. Leaving tortoises out of the class, he gives their characters as follows: cold-blooded animals, without hair or mammeæ, with lungs acting without diaphragm and almost without the aid of the ribs (swallowing air into them), torpid in winter, devouring their prey without chewing, and digesting it very slowly, able to exist for months without food, and renewing their youth by changing their skins. Lacépède, in 1788-'9, in a work continuing that of Buffon, entitled *Histoire naturelle des quadrupèdes ovipares et des serpents*, divided reptiles into four classes—tailed and tailless oviparous quadrupeds, biped reptiles, and serpents; the first containing the tortoises and saurians, the second the frogs and toads, the third and fourth being sufficiently characterized by the names; he made only 292 species. Alexandre Brongniart, in 1799, taking into consideration not only the external characters but those presented by the mode of generation and development, divided reptiles into the four orders of chelonians, saurians, ophidians, and batrachians. In 1800 Duméril introduced into the first volume of his *Leçons d'anatomie comparée* a classification adopting the names of Brongniart, and separating the batrachians as a distinct order. Daudin,

in 1802-'4, published a general treatise on reptiles, at the end of the eighth and last volume of which is a *résumé* in which he divides the class into four orders, like Brongniart. Oppel, a Bavarian naturalist, published at Munich in 1811 a small quarto volume on the orders, families, and genera of reptiles, in which he adopts a mode of arrangement borrowed principally from Duméril. Latreille, in his *Histoire naturelle des reptiles* (1802), followed the classification of Lacépède with some slight modifications; in 1825, in his *Familles du règne animal*, adopting most of the divisions and some of the names of contemporary herpetologists, he makes two classes, reptiles and amphibians. Cuvier, in his *Tableau élémentaire de l'histoire naturelle des animaux*, in 1798, divided reptiles, with Lacépède, into oviparous quadrupeds, serpents, and bipeds, giving, however, some new views on their division into orders, correcting errors in generic characters, and advocating a classification founded on organization. In 1817, in his *Règne animal*, and in the second edition in 1829, Cuvier published a new arrangement, based on internal as well as external structure, and following chiefly the method of Duméril, for many years professor of this branch in the museum of natural history at Paris. He makes four orders, of which the chelonians, saurians, and ophidians have a heart with two auricles, and the batrachians with a single auricle, the first two with limbs, the third without them; in the chelonians the jaws are toothless and corneous; in the saurians the jaws are furnished with teeth, and the limbs with five or four toes to each, including the crocodilians, lacer- tians, iguanians, geckotians, chameleoni- ans, and scincoids; in the ophidians the skin is either scaly as in *anguis* and the true serpents, or naked as in *cæcilia*; in the batrachians the tail may be absent or long, the feet four or two, and the lungs with or without coexistent branchiæ. De Blainville, in 1822, established two classes for reptiles (*ostéozoaires*), reptiles proper (*squammifères ornithoïdes*), and ichthyoid amphibians. Dr. J. E. Gray, in 1825, published a synopsis of the reptiles and amphibians of North America; in the first class he makes five orders: 1, emydo-saurians or *loricata*; 2, saurians; 3, saurophidians, such as the skinks and chalcidians; 4, ophidians or serpents, divided into the venomous and non-venomous groups; and 5, chelonians. The amphibians he makes a class by themselves, placing among them all batrachians, in the four orders of *anoura*, *urodela*, sirens, and *apoda* or pseudophidians (*cæcilia*). This very natural system is founded largely on that of Oppel. In 1831 the same author published, in vol. ix. of Griffith's edition of Cuvier's "Animal Kingdom," a second synopsis with short descriptions; he divides reptiles, exclusive of amphibians, into two sections: *cataphracta*, or shielded reptiles, and *squamata*, or scaly reptiles. In this, and in subsequent modifications of it in the "Cata-

logues" of the British museum, he borrows largely from Wagler (noticed below) and contemporary writers. Oken, in his "Physiophilosophy" (Ray society, 1847), gives a classification, elaborated between the years 1802 and 1826, in which he places reptiles in his second province of *sarcozoa*, fourth circle of fleshy animals, and eleventh class of *myozoa* or *rhinozoa*; the first of the above class terms relating to the fact that typical or true muscles, of a red color, and provided with tendons, are first found in reptiles, and the last to the equally important fact that, in the genetic development of the organs of sense, the nose in reptiles, first in the animal series, opens into the mouth, permitting the passage of air to the respiratory organs. This classification proceeds from the lowest reptiles (tailed batrachians) to the highest (crocodiles). Carus, in his "Comparative Anatomy," French translation (1828 and 1834), places reptiles in his third circle, *céphalozoaires*, and fifth class, *céphalo-gastrozoaires*; with orders: I., *branchiata* (siren and proteus), having relations to fishes; II., *pulmonata*, the true representatives of the class, with the suborders batrachians, ophidians, saurians, and chelonians—some (ichthyosaurus and triton) approaching fishes, others (dragons) the birds, others (amphisbæna) even the worms, and others still (the tortoises) the mammalia; III., *alata*, related to birds, including the fossil pterodactyl. Much of this and subsequent classifications is borrowed from Oken. Fitzinger, in 1826, published at Vienna his *Neue Classification der Reptilien*, rich in anatomical and physiological research; he adopts the classification of Brongniart modified by Oppel, with much of the nomenclature of Merrem. The class is divided into two orders, *monopnoa* and *dipnoa*, according as the respiration is pulmonary only or pulmonary and branchial, the first corresponding to reptiles proper, and the last to batrachians. In a table he gives some interesting affinities between reptiles and the higher and lower vertebrates; the pterodactyls, through the dragons and anolis, have some analogies with the mammal bats; the gavials and large fossil saurians connect the lizards with the cetacean dolphins; some chelonians seem to connect reptiles with the mammal monotremata, and others (like the imbricated tortoise) with birds of the penguin family; in the same way the descent to fishes is made by the cæcilians and the sirens. The method of Ritgen, published in the volume for 1828 of the *Nova Acta Academia Naturæ Curiosorum*, is based upon correct principles, but the author has attempted to unite too many distinctive characters under one head, and has in this way originated a most sesquipedalian and ill-sounding nomenclature. Wagler, in 1830, published at Munich his "Natural System of Amphibia," based essentially on their organization. He established eight orders in the class, as follows: 1, the *testudines*; 2, the crocodilians; 3, the lizards; 4, the serpents; 5, the *anguis* (blind-

worm, &c.); 6, *cæciliæ*; 7, *ranæ* (frogs and salamanders); and 8, *ichthyodes* (sirens, menobranchs, &c.), from their fish-like forms. He includes 248 genera. In chronological order would come here the classification of Duméril and Bibron, whose work, *Erpétologie générale, ou histoire naturelle complète des reptiles* (10 vols. 8vo, 1835-50), is the most extensive ever published on this subject; though more recent observers have introduced some changes, their classification may be considered as representing, on the whole, the actual state of herpetology. When their work was commenced, in 1835, the materials at their command numbered about 850 species, which number they largely increased. They divide reptiles into the four orders of chelonians or tortoises, saurians or lizards, ophidians or serpents, and batrachians or frogs and salamanders. McLeay, in the *Hore Entomologica* (1819-21), divides the animal kingdom into five great circles, each containing five smaller ones; the five groups of the class reptiles he considers to stand in the following natural order: 1, the chelonians; 2, emydosaurians, or crocodiles; 3, saurians; 4, dipod or two-footed serpents; and 5, apod or true serpents—the extremities of the column seeming to meet in the *chelodina longicollis* (Gray), and the whole forming a group distinguished from birds by being cold-blooded, and from amphibia by having two auricles to the heart, by undergoing no metamorphosis, and by a different method of generation. One great defect of this classification is, that it leaves entirely out of view the fossil enaliosaurian reptiles. Swainson, in his "Natural History of the Monocardian Animals" (Lardner's "Cyclopædia," vol. ii., 1839), like McLeay, makes a distinct class of the amphibia, and divides reptiles into five orders: 1, emydosaurians, or crocodiles; 2, chelonians; 3, enaliosaurians (*ichthyosaurus*, &c.); 4, ophidians; and 5, saurians. Strauss-Durckheim, in his *Traité d'anatomie comparative* (1843), divides his third class, or reptiles, into the three orders of saurians, ophidians, and batrachians, making a separate and fourth class of the chelonians, with the single order of *testudinata*. Stannius, in the second volume of the second edition of his "Manual of Comparative Anatomy" (Berlin, 1854-6), in the class 17, *reptilia*, makes two subclasses, *dipnoa* and *monopnoa*. Milne-Edwards, in his *Cours élémentaire d'histoire naturelle* (1855), divides the vertebrata or *ostéozoaires* into two sub-branches; in 1, the *allantoidia*, he places with mammals and birds the class of reptiles, with the orders *chelonina*, *sauria*, and *ophidia*; and in 2, *anallantoidia*, with fishes, he places the batrachians, with the orders *anura*, *urodela*, *perennibranchia*, and *cæcilia*.—There are several German systems of classification, which deserve notice in regard to reptiles. Von Baer, in 1826-8, in his vertebrate, or doubly symmetrical type, rises from osseous fishes to amphibia, in which lungs are formed, the branchial fringes remaining in the

sirens and disappearing in the *urodela* and *anura*; thence to reptiles, which acquire an allantois, but have no umbilical cord, nor wings, nor air sacs, the last two being characteristic of birds. Van Beneden, in his *Anatomie comparée* (Brussels, about 1855), makes reptiles and batrachians the third and fourth classes in his *hypocotyledones* or hypovitellians (*vertebrata*), in which the vitellus enters the body from the ventral side; the reptiles he divides into *crocodili*, *chelonii*, *ophidii*, *saurii*, *pterodactyli*, *simosauri*, *plesiosauri*, and *ichthyosauri*; and the batrachians into *labyrinthodontes*, *peromelia*, *anura*, *urodela*, and *lepidosirenia*. Vogt, in his *Zoologische Briefe* (1851), bases his classification on the contrast between the embryo and the yolk, and makes the reptiles and amphibia the third and fourth classes in the *vertebrata*, or animals with the yolk ventral; in reptiles he includes the orders *ophidia*, *sauria*, *pterodactylia*, *hydrosauria*, and *chelonina*; and in amphibia the orders *lepidota*, *apoda*, *caudata*, and *anura*. These classifications are important, as showing the tendency of modern zoology to combine embryological with external and structural characters, in establishing the natural divisions among animals; for full details and interesting remarks on these and other systems, the reader is referred to the "Essay on Classification" in Prof. Agassiz's "Contributions to the Natural History of the United States," vol. i.—T. Rymer Jones, in the article "Reptilia," in the "Cyclopædia of Anatomy and Physiology," vol. iv., gives the following classification, considering the batrachians as a separate class: Order I., *chelonina*; II., *sauria*; and III., *ophidia*. Van der Hoeven, in his "Handbook of Zoology" (English translation, 1858), thinks De Blainville went too far in elevating the batrachians into a class, and goes back toward the old fourfold division, adding however two orders. He divides reptiles into two sections: *diplopnoa* or *psiloderma*, breathing by lungs or gills and with smooth skin; and *haplopnoa*, breathing by lungs only, and with a scaly skin. Owen, in the "Anatomy of Vertebrates" (vol. i., 1866), makes the following subclasses in the reptilian division of the *hamatoerya* or cold-blooded animals, which include also the fishes: subclass 5, with orders *ichthyopterygia*, *ichthyosaurs*; *sauropterygia*, *plesiosaurs*; *anomodontia*, like diacynodon and *rhyrachosaurus* (all of the above extinct); *chelonina*, tortoises and turtles; *lacertilia*, lizards, &c.; *ophidia*, serpents; *crocodilia*; *dinosauria*, *iguanodon*, &c.; and *pterosauria*, *pterodactyl*, &c. (the last two also extinct). Prof. T. H. Huxley, in the "Introduction to the Classification of Animals" (London, 1869, really dating back to 1864), calls the second "province" of vertebrates *sauropsida*, comprising reptiles and birds, the close affinity between the two being shown by such reptilian birds or bird-like reptiles as *archæopteryx*. (See *Αρχαιοπτερύξ*.) The reptiles are the second class of the province, there being four

living and five fossil orders: 1, *crocodilia*; 2, *lacertilia*, as lizards, blindworms, and chameleons; 3, *ophidia*, or snakes; 4, *chelonía*, turtles and tortoises; and the following fossil: 5, *ichthyosauria*; 6, *plesiosauria*; 7, *dicynodontia*; 8, *pterosauria*; 9, *dinosauria*. Prof. Nicholson, in his "Text Book of Zoology" (London, 1872), adopts the same classification, simply adopting Owen's names for the fifth, sixth, and seventh orders of Huxley.—First in the order of American classifications of native reptiles is that of Harlan, given in the "Journal of the Philadelphia Academy of Natural Sciences" (vols. v. and vi., 1826). He adopts Brongniart's four orders, dividing them as follows: 1, *batrachia*, divided into three sections according to the mode of respiration; the first has the branchial openings persistent, as in *amphiuma* and *menopoma*, the second with persistent branchia, like *siren* and *menobranchus*, and the third with deciduous branchia, breathing by lungs in the adult state (salamanders, frogs, and toads); 2, *ophidia*, with six North American genera; 3, *sauria*, with six genera; and 4, *chelonía*, with three families of land, fresh-water, and sea tortoises, with two, three, and two genera respectively. Dr. J. E. Holbrook, in his "North American Herpetology" (5 vols. 4to, 1842), adopts the four orders of *chelonía*, *sauria*, *ophidia*, and *batrachia*; in the *chelonía*, *sauria*, and tailless *batrachia*, he follows essentially the arrangement of Duméril and Bibron; in *ophidia* he prefers Cuvier's classification; and in the tailed *batrachia*, a system partly from Cuvier and partly from Fitzinger. His work is very valuable to the American student, both for its lucid descriptions and excellent illustrations. Messrs. Baird and Girard have published in the "Reports of the Smithsonian Institution" (1853) a catalogue of North American serpents, of the families *crocalidæ*, *colubridæ*, *bovidæ*, and *typhlopidae*; of 35 genera they make 22 new, and of 119 species 54 new. Mr. Baird has published a revision of the North American tailed *batrachia*, with new genera and species, in the "Journal of the Academy of Natural Sciences" (vol. i., 2d series, 1850), adopting the two groups of Duméril and Bibron, *atretodera* and *trematodera*. In the same journal, vol. iii., 1858, is a paper by Dr. E. Hallowell on the caduceibranchiate batrachians. Mr. J. Le Conte, in the "Proceedings of the Academy of Natural Sciences" (vol. vii., 1854), gives a catalogue of the American *testudinata*, which he divides into three families, corresponding to sea, fresh-water, and land tortoises. Other catalogues of American reptiles, more or less extensive, are scattered through the scientific journals. De Kay, in the "Natural History of New York" (1842), divides its reptiles into the orders: 1, *chelonía*, with family *chelonidæ*; 2, *sauria*, with families *scincidæ* and *agamidæ*; and 3, *ophidia*, with families *colubridæ* and *crocalidæ*. The amphibia he divides into the families *ranidæ*, *salamandridæ*, *sirenidæ*, and

amphiumidæ. Prof. Agassiz, in his "Essay on Classification" (1857), insists on the separation of the amphibians as a class from the reptiles, from the different manner in which their structural plan is carried out; the former breathe by lungs or gills, undergo metamorphosis, lay a large number of small eggs, and have a naked skin; the latter are covered with horny scales, lay few and comparatively large eggs, breathe by lungs, and undergo no marked transformation; these differences require special ways and means in framing their structure, which ought to rank them as distinct classes. Prof. Agassiz divides his fifth class, or amphibians, into three orders, *cæciliæ*, *ichthyodii*, and *anura*; and the sixth and higher class, reptiles, into four orders, *serpentes*, *saurii*, *rhizodontes*, and *testudinata*. In part ii. of his first volume, above referred to, he divides the order *testudinata* into the suborders: 1, *chelonii* (Opp.), with two families, *chelonoidæ* and *sphargididæ*; 2, *amydæ* (Opp.), with seven families, *trionychidæ*, *chelyoidæ*, *hydraspididæ*, *chelydroidæ*, *cinosternoidæ*, *emydoidæ*, and *testudinina*. A large part of the first and all of the second volume is taken up in the consideration of the whole subject of North American *testudinata*, with numerous illustrations.—The above are the principal systems of herpetology, and are sufficient to show the progress of this branch of zoology, and its gradual approach toward a natural method of classification. Those who wish to pursue the subject into its details are referred to the list of authors in the work of Duméril and Bibron, and in the foot notes to the essay of Prof. Agassiz.

HERRERA, Fernando de, a Spanish poet, born in Seville in 1584, died in 1597. Although he was an ecclesiastic, many of his verses are amatory effusions addressed to a lady, said to have been the countess of Gelves, whom he celebrates under the names of Estella, Eliodora, and Aglaë. He was a friend of Cervantes and of the painter Pacheco. His best poems are mostly sonnets, odes, and elegies. An edition of his works was published at Seville in 1582. His principal prose works are *Relacion de la guerra de Chipre y suceso de la batalla de Lepanto* (Seville, 1572), and *Vida y muerte de Tomas Moro* (1592).

HERRERA, I. Francisco de, the elder, a Spanish painter, born in Seville in 1576, died in Madrid in 1656. He was a pupil of Luis Fernandez. By the boldness and spirit of his drawing and the clearness of his coloring he virtually founded a new school. His most noted picture is the "Last Judgment" in the church of St. Bernard in Seville. His "Holy Family" and "Outpouring of the Holy Spirit," in the church of St. Inez, and his frescoes in the cupola of St. Bonaventura, are also masterpieces. In his old age he went to Madrid, and painted in the cloister of la Merced Calzada several scenes from the life of San Ramon. He excelled in painting fairs and market scenes, and etched several plates from his own compositions. He

also engraved on bronze, and was accused of uttering base coin. **II. Francisco de**, the younger, youngest son of the preceding, also a painter, born in Seville in 1622, died in 1685. He studied first with his father and then at Rome, and excelled in pictures of still life, flowers, and fish, for the last of which the Italians called him *Il Spagnuolo dei pesci*. After his father's death he went to Seville and painted in the churches, but from jealousy of Murillo soon removed to Madrid, where he was appointed painter to the king and superintendent of the royal works. His best pictures are the great altarpiece of the barefooted Carmelites, representing St. Hermendildo; the "Assumption of the Virgin," in the convent of Nuestra Señora de Atocha; and "St. Anne teaching the Virgin to Read," in the convent of Corpus Christi.

HERRERA Y TORDESILLAS, Antonio de, a Spanish historian, born at Cuellar, in the province of Segovia, about 1549, died in Madrid, March 29, 1625. He early went to Italy, where he became secretary to Vespasiano Gonzaga, with whom he subsequently returned to Spain. His patron when dying recommended him to Philip II., who appointed him first historiographer of the Indies and one of the historiographers of Castile, titles which he preserved under Philip III. and Philip IV. His reputation rests on his *Historia general de los hechos de los Castellanos en las islas y tierra firme del mar Océano* (4 vols., Madrid, 1601-'15). His other works, including *Historia general del mundo del tiempo del señor rey Don Felipe II. desde 1559 hasta su muerte* (3 vols., Madrid, 1601-'12), and *Historia de Portugal y conquista de las islas de los Azores* (in 5 books, 1591), were, according to Ticknor, all written under the influence of contemporary passions.

HERRICK, Robert, an English poet, born in London, Aug. 20, 1591, died in October, 1674. He studied at Cambridge, and for many years after leaving the university seems to have pursued a gay and dissipated career in London. He then took orders, and in 1629 was presented by Charles I. to the vicarage of Dean Prior, near Totness, in Devonshire. His poems written at this time abound in lively descriptions of the charms of a country life, and his fancy revelled in amatory verses, after the fashion of the day, to imaginary beauties, for his small household comprised only himself and his old housemaid Prudence Baldwin. Some of these pieces also contain curious illustrations of country customs, manners, and prejudices. From this humble retreat the long parliament ejected him in 1648, and he returned to London, where he gladly resumed the society of such of his old associates as were living, but led a somewhat precarious existence. In 1647 and 1648 he published his "Noble Numbers" and "Hesperides, or Works Humane and Divine," which he dedicated to "the most illustrious and most hopeful Prince Charles." On this occasion, in consideration of the class

of readers who would peruse his works, he announced himself as "Robert Herrick, Esquire." At the restoration Charles II. reinstated him in his old living, where he passed the remainder of his days. Herrick was essentially a lyric poet, and the facility with which he wrote is recognized in the multitude of little pieces, amatory, Anaacreontic, and pastoral, which his works contain. His frequent indelicacy is the gravest charge which has been brought against him. In that, however, he but followed the fashion of the cavalier poets, and there is much hearty gayety and natural tenderness in his works. His serious pieces are morally unexceptionable, but have generally less poetical merit. For nearly a century and a half after Herrick's death his works lay neglected. In 1810 a selection from the "Hesperides" was edited by Dr. Nott, and since then several excellent editions have been published in England and America, including one by Prof. Child (2 vols. 12mo, Boston, 1856). A new edition of his poetical works was published in London in 1859. Many of his shorter songs, such as "Cherry Ripe" and "Gather ye rose-buds while ye may," have been set to music.

HERRING, the general name of the family *clupeidæ* of the malacopterous or soft-rayed abdominal fishes. The family has been divided by Valenciennes, according to the position of the teeth, size of the ventrals, length of the anal, and projection of the lower jaw, into 16 genera, of which the best known and most important are *clupea* (the herring), *harengula* (the sprat), *rogenia* (the whitebait), *alosa* (the shad and pilchard or sardine), and *engraulidæ* (the anchovy). The last has been described under *ANCHOVY*, and, as the others will be noticed in their regular order, the herrings proper will alone be noticed here. The generic characters of *clupea* (Cuv.) are small premaxillary teeth, with very fine ones also on the maxillary and symphyseal portion of the lower jaw, larger teeth in a longitudinal band on the vomer and centre of tongue, and a few deciduous ones on the palate bones; body elongated and compressed, with rounded back, and sharp, keel-like abdominal edge; scales large, thin, and easily removed; a single dorsal fin, and eight branchiostegous rays; mouth large, and lower jaw the longer; the air bladder is very large, and the number of long and slender bones among the muscular fibres very great; the branchial openings are wide, and the gills remarkable for the length of their fringes, in consequence of which they live but a short time out of water; indeed they die so soon that "dead as a herring" is a common English saying. The herrings do not ascend rivers like the alewife and shad.—The common American species, or blue-back, sometimes erroneously called "English herring," is the *C. elongata* (Lesueur); it varies in length from 12 to 15 in.; the color above is deep blue, tinged with yellow, with silvery sides and lower parts; opercles brassy, and, like the sides, with me-

tallic reflections; irides silvery and pupils black. It is found on the coasts of New England, New Brunswick, and Nova Scotia; it is generally most abundant from March to May, but according to Mr. Perley is caught on the shores of New Brunswick during every month of the year, precluding the idea that it is migratory.



American Herring (*Clupea elongata*).

In spring it is often caught in seines and sweep nets to the amount of 100 barrels or more in a single night; it is eaten fresh, salted, and smoked; the young fish, called spirling, make excellent bait for cod. Until within the last 30 years this herring was very abundant on our coasts, frequenting the harbors of Cape Cod in myriads from March till June; since that time it has been comparatively rare; in Massachusetts bay great quantities were formerly caught by nets when following the light of a large torch in a swiftly rowed boat. The herring fishery seems to have been prosecuted by the pilgrims, and we read of the herring "wear" at Plymouth having been rented to three men for a term of three years. Dr. Storer considers the brit, *C. minima* (Peck), the young of this species. When this herring first made its appearance in Long Island sound in 1817, it was mistaken for the English herring, and it was gravely stated that it followed the British squadron thither in the attack upon



European Herring (*Clupea harengus*).

Stonington in 1814. Several other American species are described in Storer's "Synopsis of the Fishes of North America."—The common herring of Europe (*C. harengus*, Linn.) is from 10 to 13 in. long, having the back and the upper portion of the sides sky-blue, with a tinge of sea-green; belly and sides bright silvery; cheeks, gill covers, and irides tinged with gold.—The food of the herring appears to be, chiefly minute crustaceans and worms, and sometimes its own fry and other small fish. It is the popular belief that the herrings retire in

winter to the arctic regions, whence they migrate in immense shoals in spring, summer, and autumn to the coasts of Europe, Asia, and America. Yarrell and other modern observers doubt this, and maintain that these fish merely come from deep water to the shores in their spawning season, making no very lengthened journeys, and by no means the migrations described by Pennant and the older naturalists; at any rate they are found on both the American and European coasts at all seasons, but sometimes disappear for years from certain localities, probably as their favorite food is abundant or scarce, and they have not been observed on their return northward. Wherever they come from, they appear in vast shoals, covering the surface of the sea for miles; they afford food for rapacious birds and aquatic animals, and supply material for one of the most important fisheries. They vary considerably in size in different latitudes and in limited localities, being generally largest and in best condition in the north; the time of spawning is various, as we have spring, summer, and autumn herrings. Notwithstanding the destruction of these fish by man and animals, their numbers do not diminish, a fact not astonishing when it is remembered that about 70,000 ova exist in each female, a large portion of which might be unfecundated or destroyed, and yet enough remain to stock the ocean. The regularity of their appearance and their immense numbers have made them the pursuit of man from the earliest times; the herring fishery of France dates back to the beginning of the 11th century, and that of Great Britain 300 years earlier, and both have proved excellent schools for seamen for the mercantile and naval service of these countries. It was prosecuted at a very early period also by the Dutch, who fished on the British coasts when the business was comparatively neglected by the English. Amsterdam became at one time a great centre of the trade, and the prosperity of Holland was largely due to it. Political economists in England, France, and Holland have always regarded this fishery as of the greatest national importance, in its influence on the marine service, and as a source of profitable industry at home and of extensive commerce abroad.—The herring fishery is surpassed only by the cod fishery in the value of its products. The quantity of cured herrings brought in by United States vessels, as reported by the bureau of statistics for the year ending June 30, 1873, was 75,770 cwt., valued at \$188,361, besides which large quantities are consumed fresh. Vessels, especially from Gloucester, Mass., visit the coasts of New Brunswick, Newfoundland, the Magdalen islands, and Labrador for herrings. The business is pursued in the spring and winter. An important fishery is during the winter along the coast of Maine and in the bay of Fundy, the herrings being preserved frozen, and sold in the markets of Portland, Boston, New York, and other cities.

The product of the Dominion of Canada, as returned by the commissioner of fisheries, for the year ending June 30, 1872, was 293,932 barrels of salted and 606,705 boxes of smoked herrings, valued at \$1,312,306; the product of Nova Scotia being valued at \$682,628, of New Brunswick at \$500,628, of Quebec at \$87,206, and of Ontario at \$41,844. The chief seats of the Newfoundland fishery are Labrador, the bay of Islands, Bonne bay, and St. George's bay on the W. coast, and Fortune bay on the S. coast. In the bay of Islands the herring fishery opens in September and continues throughout the winter. When the bay is frozen the fish are taken in nets through holes in the ice. The exports of herrings from Newfoundland in 1872 amounted to 140,873 barrels salted, and 6,898 fresh. Of the whole amount 53,780 barrels were from Labrador and 53,000 from the French shore. The Scotch herring fishery is pursued along the N. W. and E. coasts, the latter being the seat of the most productive fishery. The quantity cured in 1872 was 773,859 barrels, of which 751,524 were cured on shore, and 22,335 in vessels; 671,703 were cured gutted, and 102,156 ungutted. The number of vessels fitted out was 95 (making 136 voyages); tonnage, 2,976; number of men, 434. The number of boats employed in a selected week for each district was 8,252; fishermen, 29,378; whole number of employees, including curers, &c., 58,899. The fishery is pursued to some extent in the winter, but chiefly in the summer. Yarmouth is the headquarters of the English herring fishery, employing about 200 vessels and 2,000 men. The winter fishery which closed with January, 1872, was unusually productive, 240,000,000 fish, equivalent to about 600,000 cwt., being landed. The value of the herring fishery along the E. coast of Ireland in 1872 was about £250,000, the greater portion of which was obtained by Cornish, Scotch, and Manx boats. The highest number of boats that fished during the season was 394, of which 116 were Irish, 120 Cornish, 100 Scotch, and 58 Manx. The exports of herrings from the United Kingdom during that year amounted to 631,750 barrels, valued at \$891,634. When pickled and packed in barrels they are known in Great Britain as "white" herrings; salted and smoked, they are called "red" herrings. "Bloaters" are herrings slightly cured and smoked, and intended for immediate use. In France, in 1869, 222 vessels of 11,944 tons and 4,209 men were fitted out for the salt herring fishery, and 561 vessels of 14,782 tons and 6,941 men for the fresh herring fishery; 270,150 cwt. of salt and 132,140 of fresh fish were brought in. The Dutch fisheries, which once surpassed all others, have greatly declined, but the Dutch herrings still command the highest price in the continental markets. The product of the Norwegian fishery is about 1,000,000 barrels a year. In most of the northern countries of Europe large quantities are annually captured. For a detailed

account of the habits and fishery of the herring, the reader is referred to vol. xx. of the *Histoire naturelle des poissons*, by Cuvier and Valenciennes, by whom several other species are described.—The history of this fish is connected with many strange superstitions and beliefs; their sudden disappearance has in various places been attributed to fires on the shores, the discharge of cannon, and the action of steamboat wheels. (See FISHERIES.)

HERRING, John Frederick, an English painter, born in Surrey in 1795, died Sept. 22, 1865. His father was a London tradesman, an American by birth, and he himself was a stage coachman in early life. His ambition was to paint a race horse, and for 18 years he persevered, until he achieved reputation in this class of subjects. For 33 years he took the portraits of the winners of the Doncaster St. Leger, and painted an immense number of racers and racing scenes for eminent patrons of the turf. Afterward he executed scenes from the farmyard, in which, although the horse is still the prominent object, many other animals and a variety of fowls and birds are introduced. Many of these are extensively known through engravings, which have considerable popularity in the United States, where some of his best pictures have also been exhibited. Among his pictures are "The Roadside," "The Members of the Temperance Society," and "The Baron's Charger."

HERRNUT. See MORAVIANS.

HERSCHEL. **I.** Sir William, an English astronomer, born in Hanover, Nov. 15, 1738, died at Slough, near Windsor, Aug. 23, 1822. His father, a musician, educated him to his own profession, and at the age of 14 placed him in the band of the Hanoverian foot guards. In 1757 he went to England to seek his fortune, and for some years he devoted himself to music for support. He is said to have been engaged in military bands and at concerts, but there is much confusion in the stories relating to this period of his life. He became organist at Halifax, and in 1766 at the Octagon chapel in Bath. In the latter place he first turned his attention to the study of astronomy, particularly to the construction of optical instruments. In 1774 he had made a large reflecting telescope. While at Bath he constructed 200 Newtonian telescopes of 7 ft. focus, 150 of 10 ft., and about 80 of 20 ft., and did far more than any one who had preceded him in uniting to the best advantage the magnifying and the illuminating power of the telescope. Either of these qualities may easily be strengthened, but at the expense of the other, and the exact proportion in which they must be united to render the greatest amount of light effective was a problem which required many careful experiments. With one telescope, magnifying 227 times, Herschel began a careful survey of all the stars, serially; and while examining the constellation of Gemini, he noticed (March 13, 1781) that one of them appeared unusually

large, and a second examination showed it to have changed its place. Finally he pronounced it a comet, and it was so published in the "Philosophical Transactions" (1781). This announcement drew the attention of astronomers to the supposed comet, and they began to endeavor to compute its course. The president Saron first pronounced it a planet, and then Lexell and Laplace, almost simultaneously, computed its elements, and found it to have an elliptical orbit, whose great axis was about 19 times greater than that of the earth, and the period of its revolution to be 84 years. Herschel had taken no part in the mathematical calculations, but on its being pronounced a planet, he proposed to name it the Georgium Sidus. It has often been called Herschel, but the name Uranus, applied to it by Bode, has been generally adopted. Herschel now turned his attention most carefully to this planet, determined the apparent diameter (about $4''$) for its mean distance from the earth, and discovered two of its satellites, revolving in a plane nearly perpendicular (at an angle of $78^{\circ} 58'$) to its orbit, and contrary to the order of signs (that is, from east to west). He thought he had also detected four other satellites; but it is now generally believed that he mistook faint stars for satellites, and that Uranus has only four, two of which were discovered by Lassell, of England, in 1851. The discovery of Uranus attracted the attention of all Europe, and Herschel was made private astronomer to the king, with a salary of £400 and a house near Windsor, first at Datchet, and finally at Slough. With funds advanced by the king, Herschel constructed his celebrated 40-foot reflecting telescope, the metal speculum of which was 4 ft. in diameter, $3\frac{1}{4}$ in. thick, and over 2,000 lbs. in weight. The plane mirror of the instrument was dispensed with, and the observer sat in a swinging chair with his back to the object observed, and facing the object end of the tube, in which the image, by an inclination of the speculum, was thrown to one side and observed through a single lens. He conjectured that with this instrument 18,000,000 stars might be seen in the milky way.—Though Herschel discovered an almost unprecedented number of new bodies in the planetary system, yet his glory is greatest in sidereal astronomy, of which he laid almost the foundations. His leading discoveries in this branch of the science were the following: I. The binary system of stars, and the orbits of several revolving stars. Double stars had been noticed even before the introduction of the telescope; but while Herschel was observing them to learn their annual parallax, he noticed a steadily progressive change in their position and distance; and in 1802, 23 years after he began his observations, he announced in the "Philosophical Transactions" his discovery that both stars were revolving round their common centre of gravity, and all his instances have been confirmed. II. He classified the nebulae, and advocated the

nebular hypothesis, since supposed to be disproved by the discoveries made with the great telescope of Lord Rosse, but now accepted as demonstrated by the results of spectroscopic analysis. He discovered that these nebulous spots cover at least $\frac{1}{10}$ of the visible firmament, and in 1802 he indicated the positions of 2,500 nebulae or clusters of stars. He classified them as: 1, clusters of stars; 2, nebulae proper; 3, nebulous stars. III. The law of grouping the entire visible firmament. He "ganged" the heavens, by counting the whole number of stars visible in the field of his 20-foot reflector, and taking the average for each region. The result showed a remarkable and steady law of decrease, from the central zone of the milky way in opposite directions to the northern and southern poles. IV. The determination of the fact of the motion of our system, and the direction of that motion. It was already known that the stars were not fixed, but had a proper motion. Herschel, from the proper motions of about 20 stars, with great penetration, divined that our system was moving in the direction of λ Herculis, a point whose right ascension is 270° , and north declination 25° . Besides discovering the satellites of his own planet, Herschel discovered two new satellites of Saturn, now called, from their being next the ring, the first and second, and determined the rotation of the rings of the planet to be in 10 h. 32 m. He found also that the time of the rotation of the satellites of Jupiter was just equal to the period of their revolution about the planet. When his age made it advisable for him to discontinue his observations in the heavens, he turned his attention to the properties of heat and light. He also gave some valuable opinions concerning the spots on the sun, attributing them to occasional openings in the luminous coating, which seems to be always in motion.—Herschel contributed papers, sometimes several in a year, to the "Philosophical Transactions" from 1780 to 1815. He married in 1788 Mrs. Mary Pitt, a widow of considerable fortune, and had by her one son, John. II. *Caroline Lucretia*, sister of the preceding, born in Hanover, March 16, 1750, died there, Jan. 9, 1848. She lived in Hanover till her 22d year, when she went to England to join her brother at Bath. Here she turned her attention to astronomy, and gave him great assistance, not only taking the part of an amanuensis, but frequently performing alone the long and complicated calculations involved in the observations. For this she received a pension from George III. Meanwhile she took her own separate observations of the heavens, with a small Newtonian telescope which her brother had made for her. She devoted herself particularly to a search for comets, and between 1786 and 1805 discovered alone eight of these bodies, of five of which she was the first observer. Her contributions to science, most of them in her brother's works and under his name, are very valuable. She

took the original observations of several remarkable nebulae in her brother's catalogue, and computed the places of his 2,500 nebulae. In 1798 she published her "Catalogue of Stars taken from Mr. Flamsteed's Observations, contained in the second volume of the *Historia Coelestis*, and not inserted in the British Catalogue, with an index to point out every observation in that volume belonging to the stars of the British Catalogue; to which is added a collection of Errata that should be noticed in the same volume." This work was published at the expense of the royal society, and contained about 560 stars which had been omitted by the framers of the British catalogue. After her brother's death she returned to her native city. In 1828 she completed a catalogue of the nebulae and stars observed by her brother, for which she received a gold medal from the astronomical society of London, and was elected an honorary member of it. **III.** Sir John Frederick William, an English astronomer and physicist, son of Sir William Herschel, born at Slough, March 7, 1792, died at Collingwood, near Hawkhurst, May 11, 1871. At Cambridge, where he graduated in 1813, he was distinguished for his mathematical genius and his fondness for physical science. In 1820 he published his "Collection of Examples of the Application of the Calculus to Finite Differences." About 1825 he began his observations in sidereal astronomy, to which he chiefly devoted himself, partly in conjunction with Sir James South, and the results of his observations for eight years were communicated to the royal astronomical society in a series of catalogues, the first appearing in 1825, for which he received the gold medal. In 1830 he published important measurements of 1,236 stars, which he found with his 20-foot reflector. In 1830 he wrote for the "Encyclopædia Metropolitana" a treatise on "Sound," and for the same work in 1831 a treatise on the "Theory of Light." In Lardner's "Cyclopædia" he published a "Preliminary Discourse on the Study of Natural Philosophy," and a "Treatise on Astronomy." About the same time he wrote several experimental essays on different branches of chemistry, magnetism, and optics. His great enterprise was his expedition to the Cape of Good Hope, to take observations of the whole firmament of the southern hemisphere. Taking with him the same instruments (a 20-foot reflector with an 18½-inch aperture, and a 7-foot achromatic with a 5-inch aperture) which he had used in the northern hemisphere, that his results might be compared with his former ones, he arrived at the Cape, Jan. 15, 1834, and settled at Feldhuysen, about 6 m. from Table bay. He examined carefully and measured the double stars, clusters, and nebulae of the southern skies, and completed the wonderful "gauging of the heavens" which had been begun by his father. His observations lasted four years, and the entire expense was defrayed by him-

self, though an ample indemnity was offered him by government. During his absence, in 1836, the royal astronomical society again voted him their gold medal, and on his return honors were heaped upon him. The royal society proposed to make him their president, but he was unwilling to accept the office. In 1838, at the coronation of Queen Victoria, he was created a baronet. In 1839 he received the degree of D. C. L. from Oxford, and in 1842 he was elected lord rector of Marischal college, Aberdeen. In 1847 appeared in a large 4to volume his "Results of Astronomical Observations made during the Years 1834-'8 at the Cape of Good Hope, being the completion of a Telescopic Survey of the whole surface of the Visible Heavens, commenced in 1825." This work, one of the most considerable and valuable of our time, is divided into seven portions: 1, "Nebulae of the Southern Hemisphere;" 2, "The Double Stars of the Southern Hemisphere;" 3, "Astrometry, or the Numerical Expression of the Apparent Magnitudes of Stars;" 4, "The Distribution of Stars, and the Constitution of the Galaxy in the Southern Hemisphere;" 5, "Observations of Halley's Comet (as seen at the Cape toward the close of 1835), with Remarks on its Physical Condition and that of Comets in general;" 6, "Observations of the Satellites of Saturn;" 7, "Observations of Solar Spots." His residence at the Cape gave not only valuable additions to astronomy, but also to meteorology. He suggested the plan of taking simultaneous meteorological observations at different places on given days, and embodied his views on the plan in his "Instructions for Making and Registering Meteorological Observations at various Stations in Southern Africa" (1844). Before going to the Cape of Good Hope he added 800 nebulae to the catalogue of his father, and on his return published a catalogue of 2,049 nebulae of the southern hemisphere and their positions, 500 of which were before entirely unknown. He also added, while at the Cape, 1,081 double stars, and in measuring the angles of positions and the distances of the stars from each other, found that many of them have very rapid orbital motions. He made many interesting observations on the milky way. "This remarkable belt," he says, "examined through a powerful telescope, is found (wonderful to relate) to consist entirely of stars scattered by millions, like glittering dust, on the black ground of the general heavens." Again, he conjectures, from his ingenious combinations of photometric calculations, that if the stars in the great circle of the milky way, which he saw in his 20-foot reflecting telescope, were newly risen luminous cosmical bodies, it would require 2,000 years for a ray of their light to reach us. His observations on the brightness and the color of stars, on variable stars, on the sun's rays, on the atmospheric air, and on the Magellanic clouds, are all very valuable. Sir John Herschel did not

confine his attention to astronomy. He calculated the density of the atmosphere, and held that a perfect vacuum exists at the height of 80 or 90 miles above the earth, and also that three fourths of all the atmospheric air is within four miles of the earth's surface. The question concerning the absorption of light, which gave rise to much discussion, particularly in its connection with the undulatory theory, was very ably answered by Herschel in his paper on the "Absorption of Light by Colored Media." He made some important discoveries in photography, and produced from chemical compounds and the juices of plants the most beautiful chromatic effects. Sir John Herschel contributed to the "Manual of Scientific Inquiry" (1849 and 1851), and wrote "Outlines of Astronomy" (1850; 10th ed., 1869); "Essays, from the Edinburgh and Quarterly Reviews, with Addresses and other Pieces" (1857); "Physical Geography" (1861); and "Familiar Letters on Scientific Subjects" (1866). His son, Capt. John Herschel of the royal engineers, is now (1874) collecting his letters with a view to publication. During the year 1848 Herschel was president of the royal astronomical society. In 1850 he was appointed master of the mint, which office he held till 1855, when he resigned on account of ill health. In 1855 he became one of eight foreign associates of the French academy of science.

HERSENT, Louis, a French painter, born in Paris, March 10, 1777, died there, Oct. 2, 1860. He studied under Regnault, and at the age of 20 gained the second prize at the school of fine arts. He was one of the painters to the government, and received an honorary decoration from Louis XVIII., who bought his "Ruth and Boaz" and "Monks of St. Bernard." His "Abdication of Gustavus Vasa," considered his best work, was destroyed in the sacking of the Palais Royal in 1848. His "Louis XVI. giving Alms to the People," now in the museum at Versailles, was among his later works. Almost all his pictures have been engraved.

HERSFELD, a town of Prussia, in the province of Hesse-Nassau, 10 m. N. N. E. of Fulda, on the left bank of the Fulda; pop. in 1871, 6,434. It owes its origin to a Benedictine abbey which was founded in the 8th century. With its territory it was made an ecclesiastical principality in the 12th century, under the government of the abbots. At the peace of Westphalia (1648) it was secularized, and the town of Hersfeld remained the capital till 1821, when the principality became an administrative circle. The town until lately was walled, and protected with an ancient ditch; gardens are now laid out in place of these. The river is here crossed by two bridges. Among the noteworthy buildings are the ancient council house, the fine parish church with a lofty tower and a great bell, and the ruins of the convent church which was built in the beginning of the 12th

century, in the Byzantine style, on the site of the cathedral which had been burned. The ancient monastery itself, shut off from the town, has its own district, containing the ruins of the church and the surrounding gardens and orchards. The gymnasium was founded in 1570 by Abbot Michael. Hersfeld is the head of the cloth manufactures of the former electorate of Hesse, employing 2,000 hands, and has manufactories of mixed cotton goods, soap, and red and white leather, and numerous dye works and worsted mills.

HERSTAL, a town of Belgium, in the province and 3 m. N. E. of the city of Liège, on the left bank of the Meuse; pop. in 1866, 9,326. Various kinds of iron and steel ware, especially firearms, are manufactured in the town, which has also an establishment for the extraction of pyroligneous acid, a salt refinery, breweries, &c. In the neighborhood are many coal mines. Herstal was the home of Pepin the Fat, generally called Pepin of Herstal.

HERTFORD, a N. E. county of North Carolina, bordering on Virginia, bounded E. by Chowan and Nottoway rivers, and intersected by the Meherrin, which unites with the Nottoway to form the Chowan; area, 320 sq. m.; pop. in 1870, 9,273, of whom 4,952 were colored. It has a level surface, covered in part with pine and cedar woods, which furnish large quantities of timber, tar, and turpentine for exportation. The Chowan river is navigable by sloops along the border of the county. The chief productions in 1870 were 5,430 bushels of wheat, 189,079 of Indian corn, 13,857 of oats, 49,807 of sweet potatoes, and 235 bales of cotton. There were 915 horses, 1,174 milch cows, 2,708 other cattle, 2,259 sheep, and 11,398 swine; 1 saw mill, and 7 flour mills. Capital, Winton.

HERTFORD, a town and parliamentary borough of England, capital of Hertfordshire, on the river Lea, 18 m. N. of London; pop. in 1871, 7,164. It has eight churches, a Latin school, a mechanics' institute, a branch of the London Christ's hospital, a large distillery, and several large breweries. There is an active trade in coal, timber, and corn. In 673 a national ecclesiastical council was held here, and early in the 10th century Edward the Elder rebuilt the town and built the castle, which afterward was occasionally a royal residence.

HERTFORDSHIRE, or **Herts**, an inland county of England, bordering on Cambridgeshire, Essex, Middlesex, Buckinghamshire, and Bedfordshire; area, 611 sq. m.; pop. in 1871, 192,226. Its principal rivers are the Colne and Lea with their tributaries, affluents of the Thames, and some smaller streams flowing to the Ouse. Part of the New river, which supplies London with water, is within the shire, and is conducted by an aqueduct along the valley of the Lea. The Grand Junction canal passes through the county. It is also traversed by the London and Northwestern and Great Northern railways, while the Eastern Counties railway skirts the S. E. boundary. In the

northern part of the county are several ranges of chalk hills, which attain an elevation of 900 ft. above the sea. There are manufactories of straw goods, ribbons, paper, and malt, but the principal industry is agriculture, seven eighths of the county being arable land. In the S. W. part are extensive apple and cherry orchards. There are many Roman and other antiquities, of which the most prominent are St. Alban's abbey and the ruins of Berkhamstead castle, and Roystone church and cave. Capital, Hertford.

HERTHA, *Ærtha*, or *Nerthus*, the goddess of earth (Anglo-Saxon, *eorthe*, Ger. *Erde*), anciently worshipped by the Æstii, Lombards, Angles, and many other Teutonic tribes established near the lower Elbe, and in the regions of the Baltic. The Scandinavians called her *Jord*; according to them she was daughter of Annar and Night, sister of Dagur or Day by the mother's side, wife of Odin (thus identical with *Frigga*), and mother of Thor. This identification of the female principle, or of generation and fertility, with the earth, is found in all religions. The earth being the all-nourishing mother, it was naturally believed that *Hertha* sympathized with mankind, and the myth of the revival of spring gradually became for the vulgar a faith that she visited them in person at stated times. These visits took place, according to Tacitus, on a sacred island in the Baltic, where the chariot of *Hertha* was kept. When the goddess had descended from the throne of Odin, she was believed to take her seat in the chariot. Heifers were then harnessed to it, and she was drawn amid festivity over the land. During this procession all feuds were suspended. Finally the goddess, or rather her wagon, on returning to the holy grove, was washed in the sea by slaves, who immediately after were drowned. This appearance of *Hertha* was also practised in another form among certain German tribes, with whom it was usual on occasions of drought to send the most beautiful maiden of the village, entirely naked, at the head of a female procession over the fields.

HERTZ, *Hendrik*, a Danish poet, born in Copenhagen, Aug. 25, 1798. He is of Jewish parentage, but joined the Protestant church, and studied law. In 1826 he published anonymously his first comedy, *Herr Burckhard og hans Familie*, which was rapidly followed by others. *Gjenganger-Brevene*, a polemical poem (1830), attracted much attention on account of its severe criticism of the literature of the day. His tragedy *Scend Dyrings Huus* (1837) added greatly to his popularity by its patriotic character, and a lyrical drama entitled "King René's Daughter" carried his fame into Germany, France, and England, where his works have since been translated as soon as they appeared. Among his novels, *Stemninger og Tilstande* (1839), *Johannes Johnson* (1858), and *Eventyr og Fortællinger* (1862) are specially noteworthy.

HERTZEN, or *Herzen*, Alexander, a Russian author, born in Moscow, March 25, 1812, died in Paris, Jan. 21, 1870. He studied at the university of Moscow, where he and some of his associates were arrested in 1834 on account of their socialistic tendencies. He was detained in prison nearly a year, and for several years afterward he was exiled to Siberia. In 1839 he received a full pardon and a clerkship in the ministry of the interior, which he soon lost by his strictures on the government; but in view of his high connections and attainments he was treated considerably, and received the title of councillor of state with orders to reside at Novgorod. In 1842 he asked to be released from all connection with the government, and in the same year came forward as a writer under the *nom de plume* of Iskander. In 1845-'6 he published an elaborate work showing his sympathy with the younger Hegelian school of philosophy, and in 1847 appeared his first novel descriptive of Russian life. His father's death having put him in possession of a moderate fortune, he was enabled to leave Russia in 1847. After conferring with revolutionists in Italy, France, and Switzerland, he organized a systematic propaganda against Russian absolutism by establishing a publishing house in London for printing and circulating Russian translations of the writings of Louis Blanc, Mazzini, and kindred authors. In 1856 he founded in London the *Kolokol* ("The Bell"), a journal which attained a large clandestine circulation in Russia, and through which he paved the way for the emancipation of the serfs, for the abolition of corporal punishment in the army, for judiciary reforms, and for diminishing corruption among Russian officials. In 1865 he removed to Geneva, where he published the *Kolokol* in French (*La Cloche*), but could not sustain it. He spent the latter part of his life in Paris. The loftiness of his purpose and his integrity, as well as his commanding influence on Russian progress, were respected even by his adversaries; and his claims to literary distinction rest upon a variety of writings, comprising novels and books of travel, published in Russian, German, and French, these languages having been equally familiar to him. His principal works are: *Erinnerungen aus meinem Leben* (3 vols., 1854; English translation, 2 vols., London, 1855); *Russland's sociale Zustände* (1854); *Memoiren der Fürstin Daschkow* (2 vols., 1857); "The Polar Star" (in Russian, 7 vols., London, 1857-'67; 8th vol., Geneva, 1868); *Mémoires de l'impératrice Catherine, écrits par elle-même* (London, 1859); "For Five Years, 1855-'60" (in Russian, London, 1860); *Biloe i Dumi* (3 vols., London, 1861; 4th vol., Geneva, 1867); and "Posthumous Writings" (in Russian, Geneva, 1870).—His confiscated Russian estates were restored in 1874 to his only surviving brother, in virtue of an amnesty granted on occasion of the marriage of the grand duchess Maria with the duke of Edinburgh.

HERULI, or **Eruli**, a German tribe, which in the latter part of the 3d century appeared on the shores of the Euxine, having joined the Goths in their invasion of the Danubian provinces of the Roman empire. They were afterward conquered by the Ostrogoths, followed Attila on his march to Gaul (451), and after his death, uniting with other German tribes, destroyed the western empire under their leader Odoacer, who assumed the title of king of Italy (476), but finally succumbed to the Ostrogoths under Theodoric (493). Another kingdom of the Heruli, founded in the central part of modern Hungary, was destroyed by the Lombards. Part of them then removed to the south of the Danube, and the others emigrated to the shores of the Baltic.

HERVE, a French composer, whose real name is Florimond Ronger, born at Houdain, near Arras, in 1825. His *Don Quichotte* (1847) was the first opera bouffe introduced on the French stage, and subsequently, as a protégé of M. de Morny, he became connected with theatres, where he continued to produce similar entertainments, paving the way for Offenbach, who soon eclipsed Hervé at the Bouffes-Parisiens (1855), the latter disappearing for several years from the stage. Since 1865, however, when he became leader of the orchestra at the Eldorado, he has been sharply competing with Offenbach. Among his later productions are *L'œil crevé* (1867), *Chilperic* (1868), *Le petit Faust*, and *Les Turcs* (1869).

HERVEY, **James**, an English author, born at Hardingstone, near Northampton, Feb. 26, 1713, died Dec. 25, 1758. He graduated at Oxford, took orders, and at the age of 22 was appointed curate to his father, on whose death in 1750 he succeeded to his two livings at Weston Favell and Collingtree. He was noted for his benevolence, and was well skilled in Hebrew, Greek, and Latin. In 1746-'7 he published his "Meditations and Contemplations," which have been widely read and admired. In 1753 he published "Remarks on Lord Bolingbroke's Letters on History;" in 1755, "Theron and Aspasia," a work on the Calvinistic theory of redemption. He also published letters to Wesley and to Lady Frances Shirley, and edited, with a preface, Burnham's "Pious Memorials," and Jenks's "Devotions." His works, with a memoir (7 vols. 8vo, London, 1797), have passed through numerous editions.

HERVEY, **John**, Baron Hervey of Ickworth, an English politician, born Oct. 15, 1696, died Aug. 5, 1743. He was the eldest son of John Hervey, first earl of Bristol of that name. He studied at Cambridge, and was appointed in 1716 gentleman of the bedchamber to the prince of Wales. He was looked upon as the most accomplished man of his time, and by his talents, literary tastes, and family connections was an important auxiliary to Sir Robert Walpole. In 1730 he was appointed vice chamberlain and privy councillor, and in 1733 raised to the peerage. He lost much in-

fluence on the death of the queen in 1737, but entered the cabinet, and received in 1740 the privy seal, which he lost on the fall of Walpole. He was an epileptic, and his life was protracted only by great watchfulness. Pope, in the prologue to the satires, attacked him under the name of Sporus. His most important work is the "Memoirs of the Court of George II. and Queen Caroline," edited by J. W. Croker (2 vols. 8vo, 1848; new ed., 1854).

HERVEY, **Thomas Kibble**, an English poet, born in Manchester, Feb. 14, 1799, died in Kentish Town, Feb. 17, 1859. He studied at Cambridge and at Oxford, but did not take a degree. Then he attempted the study of law, but soon abandoned it to follow his taste for literature. In 1824 he published "Australia and other Poems," the title piece being an elaboration of a prize poem. This volume, with additions, was reissued in 1829 as "The Poetical Sketch Book." In 1830 he published anonymously "The Devil's Progress," a satire. For 20 years he was a leading writer for the "Athenæum," of which he was sole editor from 1846 to 1854. His other publications were: "Illustrations of Modern Sculpture" (vol. i., 1832, never completed); "The Book of Christmas" (1836); and "England's Helicon in the Nineteenth Century" (1841).—His wife, **ELEANORA LOUISA (MONTAGUE)**, born in Liverpool in 1811, is distinguished as a writer of dramatic and other poems, tales, fairy legends, &c.

HERVEY DE SAINT DENYS, **Marie Jean Léon de**, marquis, a French sinologue, born in Paris in 1823. He early applied himself to the study of Chinese, and became president of the ethnographical society. He translated several Spanish plays into French, and among his other works are *Recherches sur l'agriculture des Chinois* (1851), a translation of *Poésies de l'époque des Thang*, with an essay on Chinese poetry (1862), and several other important translations published in 1874.

HERWEGH, **Georg**, a German poet, born in Stuttgart, May 31, 1817. He studied theology at Tübingen, but devoted himself to literature, and attracted attention in 1841 by the publication in Switzerland of his *Gedichte eines Lebendigen*, a collection of political poems, which passed through seven editions in two years (9th ed., 1871). He was expelled from Prussian territory on account of a letter which he addressed to the king, and also from Zürich, but found an asylum in Basel, where he completed the 2d volume of his *Gedichte* (1844), in a decidedly revolutionary tone. Subsequently residing in Paris, he put himself, soon after the revolution of 1848, at the head of a legion of French and German laborers, crossed the Rhine intending to revolutionize Germany, and appeared in Baden in April, but was defeated at Dossenbach by the Würtemberg troops, and fled with his wife to Switzerland. He now lives in Berlin.

HERZ, **Henriette**, a leader of Berlin society, born in that city, Sept. 5, 1764, died there, Oct.

22, 1847. She was a daughter of Dr. Lemos, a physician of Portuguese-Jewish origin, and was barely 16 when she married Dr. Markus Herz, an elderly and wealthy gentleman. Through her extraordinary beauty and intelligence she acquired great social influence. Schleiermacher was her most intimate friend, and conspicuous among her many other associates were William and Alexander von Humboldt. After the death of her husband in 1803 she continued to exercise the same commanding and beneficent influence in society, but her means were reduced, and in 1808 she was obliged for some time to accept the hospitality of friends in Rügen. On her mother's death in 1817 she embraced Christianity, and during the rest of her life, mostly spent in Berlin, she kept up her relations with distinguished people, with whom she maintained an active correspondence, but late in life she destroyed most of her letters.—See *Henriette Herz, ihr Leben und ihre Erinnerungen*, by Fürst (Berlin, 1850), and *Briefe des jungen Börne an Henriette Herz* (Leipsic, 1861). Börne lived for a considerable time in her house.

HERZEGOVINA, or **Hersek**, a province of European Turkey, forming the S. W. part of the vilayet of Bosnia, bounded N. by Turkish Croatia, W. by Dalmatia, S. by Montenegro and the gulf of Cattaro, and E. by Bosnia proper; area, 6,420 sq. m.; pop. about 290,000, of whom 180,000 belong to the Greek church, 48,000 are Catholics, and 62,000 Mohammedans, many of whom are renegades. They are chiefly of the Slavic race, and speak a Slavic dialect kindred to that of Dalmatia and Croatia. The province is covered by a branch of the Dinaric Alps, and slopes toward the Adriatic. It is traversed by the Narenta and its tributaries, which flow into the Adriatic. The products are tobacco of a very fine quality, rice, millet, and grapes. The most notable manufactures are hydromel or mead, a favorite popular beverage, and sword blades.—The province formerly belonged to the kingdom of Croatia, and was often called the country of Chulm, and by the Venetians the duchy of St. Saba, in honor of that saint. Annexed to Bosnia in the early part of the 14th century, it was wrested from it by the emperor Frederick III. (about 1450), who disposed of it in favor of Stefan Hranitch and his descendants, as an independent duchy. Hence the name of Herzegovina, the title of *Herzog* (duke) having been borne by its princes before the Ottoman conquest, which took place in 1467 under Mohammed II. After various contests, the Turks were confirmed in its possession by the treaty of Carlovitz (Jan. 26, 1699), excepting the former capital, the fortified town of Castelnuovo, in the gulf of Cattaro, and a small territory which had been held by the Venetians since 1682, and which now forms part of Dalmatia. Capital, Mostar.

HERZEN. See **HERTZEN**.

HESIOD (Gr. *Ἡσιόδος*), one of the earliest Greek poets, of whose life nothing is known ex-

cept that he dwelt at Ascrea, on Mt. Helicon, whither his father had removed from Cyme, on the Æolic coast of Asia Minor. The most general opinion of the ancients assigned Homer and Hesiod to the same period, which Herodotus fixes at about 850 B. C.; the higher antiquity of Hesiod is maintained by Ephorus of Cyme. K. O. Müller opposes the common opinion that the epic language was first formed in Asia Minor, whence it was borrowed and transferred to other subjects by Hesiod. He supposes this poetical dialect had already come into use in the mother country before the Ionic colonies were founded, and that the phrases, epithets, and proverbial expressions common to the two schools of poetry were derived from a common and more ancient source. The Hesiodic and Homeric poetry resemble each other only in dialect and form, and are completely unlike in their genius and subjects. E. Curtius says "that with Hesiod life on earth appears utterly stripped of the joyous brilliancy which the Homeric poems spread out over it; that with him it is a sunken and fallen state, a school of adversity through which man has to pass in the exercise of virtue, under the observation and support of beatified spirits. In a form of expression perfectly cognate to the Delphic sayings, the poems united under the name of Hesiod give circumstantial precepts for the different classes of human society, for knights and for peasants, and concerning both private and public life." The logographers related numerous stories of Hesiod, of his descent from Orpheus, his gift of prophecy, and his contest with Homer, which show that an early connection was conceived to have existed between the priests and bards of Thrace and Boeotia, out of which grew the elements of his poetry. The Hesiodic poetry flourished chiefly in Boeotia, Phocis, and Eubœa, and the eminence of Hesiod caused a great variety of works to be attributed to him. The "Works and Days" (*Ἔργα καὶ ἡμέραι*), the only poem which his countrymen considered genuine, is perhaps the most ancient specimen of didactic poetry, and consists of ethical, political, and minute economical precepts. It is in a homely and unimaginative style, but is impressed throughout with a lofty and solemn feeling, founded on the idea that the gods have ordained justice among men, have made labor the only road to prosperity, and have so ordered the year that every work has its appointed season, the sign of which may be discerned. The "Theogony" is an attempt to form the Greek legends concerning the gods into a complete and harmonious picture of their origin and powers, and into a sort of religious code. Beginning with Chaos, out of which rose first the Earth and Eros (love), the fairest of the immortal divinities, it completes the formation of the world, and relates the genealogies and wars of the gods and heroes, and the triumph of Zeus and the Olympians over the Titans. The Greeks considered it

high authority in theological matters, and philosophers sought by various interpretations to make it harmonize with their own theories. Another poem attributed to Hesiod was the "Heroines" (*Hoiai*), giving accounts of the women who by their connection with the gods had become the mothers of the most illustrious heroes, and containing a description of the shield of Hercules, which is all of it that is still extant. Several other Hesiodic poems are mentioned by the ancients. The best complete edition is that of Götting (8vo, Gotha and Erfurt, 1843); and the scholia on him of the Neo-Platonist Proclus, and others, are contained in Gaisford's *Poeta Græci Minores*, vol. iii. The "Works and Days" was translated into English by George Chapman (London, 1618). A poetical translation was made by C. A. Elton (London, 1810), and a prose version by the Rev. J. Banks, in Bohn's "Classical Library" (London, 1856). See also *Hesiodi Scutum Herculis*, edited by Van Lennep (Amsterdam, 1854); *Theogonia*, by Gerhard (Berlin, 1856); Flach, *Die Hesiodische Theogonie*, with *Prolegomena* (1873); and an English edition by James Davies (Edinburgh, 1873).

HESPERIDES, in Grecian mythology, the guardians of the golden apples which Terra gave to Juno as a wedding gift. Sometimes they are called the daughters of Erebus and Night, sometimes of Atlas and Hesperis, sometimes of Jupiter and Themis. Some traditions make them three, others four, and others seven. They were commonly set down at four, whose names were Ægle, Erythia, Hestia, and Arethusa. Their gardens were originally placed in the remote west, about Libya and Mt. Atlas, but later mythologists placed them in Cyrenaica, and some even in the extreme north among the Hyperboreans. Their duty was to guard the apples which Juno had committed to their care, but Hercules obtained them by the assistance of Atlas.

HESSE, Karl Adolph Heinrich, a German artist, born in Dresden in 1769, died at Wilhelmsdorf, near Vienna, July 3, 1849. He had much reputation as a painter of horses. His most famous work is the large painting, "The March of the Cossacks of the Ural through Bohemia," exhibited in 1799. He published *Studienblätter für Pferdeliebhaber*, the plates for which were etched by himself (1807), *Pferdewerke* (in 12 parts, 1807), and *Pferdeköpfe* (horses' heads), lithographed in natural size (Vienna, 1825).

HESSE, I. Karl Ernst Christoph, a German engraver, born in Darmstadt in 1755, died July 25, 1828. He first made himself known by some plates after pictures by Rembrandt in the gallery at Düsseldorf, and subsequently engraved a large portion of the gallery for a pictorial work. In 1782 he was appointed engraver to the court at Munich, and in 1806 he became professor at the academy of arts there.

II. Peter von, a painter, eldest son of the preceding, born in Düsseldorf, July 29, 1792, died

April 5, 1871. In 1813-'15 he participated in the most considerable actions against the French, and made sketches on the spot. These he afterward embodied in a series of battle pieces, of which the "Battle of Arcis-sur-Aube," the "Capture of a French Village by Cossacks," the "Bivouac of Austrian Troops," and the "Battle of Leipsic," are good specimens. He has been called the Horace Vernet of Germany. **III. Heinrich von**, a historical painter, brother of the preceding, born in Düsseldorf, April 19, 1798, died March 29, 1863. He prepared the cartoons for the decoration of the church of All Saints in Munich, in which the progress of Christianity is unfolded. He also painted for the basilica of St. Boniface in the same city 64 compositions in fresco, with figures of colossal size, illustrating the life of that saint.

HESSE (Ger. *Hessen*). **I.** Or **Hessia**, a territory of Germany, inhabited in the time of the Roman empire by the Catti, an old Germanic tribe. Germanicus is said to have destroyed their principal town, Mattium, which stood on the site of the present villages of Grossmaden and Kleinmaden, near Gudensberg. Under the early German emperors Hesse was governed by counts. The principal of these were the counts of Gudensberg of the name of Geiso. By the marriage of the heiress of the last count of Gudensberg, Geiso IV., with the landgrave Louis I. of Thuringia, this prince became sovereign of Hesse (about 1130). Till about the middle of the 13th century the history of Hesse was identical with that of Thuringia; but the landgrave Henry Raspe dying without issue in 1247, his niece Sophia, the daughter of the landgrave Louis the Pious and the wife of Henry, duke of Brabant, claimed Hesse as well as Thuringia; and after a war of succession with her cousin, the margrave Henry the Illustrious of Misnia, she was put in possession of Hesse by treaty in 1263. Sophia's son, Henry I. the Child, became the progenitor of the dynasty of Hesse, and took up his residence at Cassel. Philip I. the Magnanimous, who succeeded his father William in his sovereignty of the whole country in 1509, and who was the first to introduce the reformation, divided his dominions among his four sons (1567). The eldest, William IV., obtained one half, including the capital Cassel; Louis IV. one fourth, comprising Marburg; Philip II. one eighth, with Rheinfels; and George I. also one eighth, with Darmstadt. But Philip II. dying in 1583, and Louis IV. in 1604, without children, there remained only the two main branches of Hesse-Cassel and Hesse-Darmstadt, the former of which ceased to be a reigning family in 1866, when its territory was annexed to Prussia. It will become extinct with the death of the last elector of Hesse-Cassel. (See **HESSE-CASSEL**.) Among the side branches of the Hessian dynasty are the landgraves of Hesse-Philippsthal and Hesse-Philippsthal-Barchfeld. **II.** Former-

ly **Hesse-Darmstadt**, a German grand duchy, consisting of two large portions separated by a long strip of land extending from E. to W., which belongs to the Prussian province of Hesse-Nassau. The N. portion is bounded on all sides by Prussia; the S. portion is bounded N. by Prussia, E. by Bavaria, S. by Baden, S. W. by Rhenish Bavaria, and W. by Prussia; area, 2,964 sq. m.; pop. in 1871, 852,894, of whom 585,399 were Protestants, 238,080 Roman Catholics, and 25,373 were Jews. Hesse is divided into the provinces of Upper Hesse, Starkenburg, and Rhenish Hesse. The principal mountains are the Odenwald in the southern portion and the Vogelsgebirge in the northern. The Vogelsgebirge is a volcanic mass, occupying with its branches about 400 sq. m. The country is also traversed by branches of the Taunus, Westerwald, &c. The chief rivers are the Rhine, Main, Nahe, Nidda, and Lahn. Hesse is one of the best cultivated agricultural countries in Germany. Offenbach, near Frankfurt, is the chief manufacturing town. Mentz is the great emporium for the corn, wine, and transit trade. Darmstadt is the capital. The grand duchy possesses many railways and excellent public roads. It occupies the sixth rank in the German empire, has three votes in the federal council, and sends eight deputies to the German Reichstag. The troops of the grand duchy constituted in 1874 a separate division of the 11th army corps. The government is a constitutional monarchy. The grand duke, who bears the title of *Grossherzog von Hessen und bei Rhein*, is assisted by a council of state and a cabinet, which in 1874 consisted of the premier or president (who is at the same time minister of the grand ducal household and of foreign affairs), of the ministers of the interior, of justice, and of finance. The legislature is composed of two chambers. The annual receipts, according to the budget of 1873-'5, amount to \$4,500,000; the expenditures to \$4,250,000. The public debt was contracted almost exclusively for the construction of railways, and amounted in 1872 to about \$5,500,000. There are numerous educational institutions, the chief of which is the university of Giessen.—The line of Hesse-Darmstadt was founded in 1567 by George I., youngest son of Philip the Magnanimous. The war of succession with Hesse-Cassel which broke out under the reign of his successor, Louis V. the Faithful, continued to rage during that of his son George II. (1626-'61), but was brought to a close in 1647 by the cession of Marburg and other contested localities in exchange for Giessen and other territory. During the French revolution much territory was lost, which was more than regained by the treaty of Lunéville in 1801. Louis X. (born 1753, died 1830) joined the confederation of the Rhine, adopting as grand duke the name of Louis I., obtained from Napoleon still further accessions of territory, caused his troops to act against Austria in 1809 and in concert with

the French in 1813, but joined the allies after the battle of Leipsic, on condition of being left in possession of his newly acquired territory. In 1815 he joined the German confederation, and made large cessions on the right bank of the Rhine to Prussia and other states, but obtained valuable possessions on the left bank of that river, including Mentz and Bingen. In 1828 he joined the Prussian customs union, by which he gave the first impulse to the formation of a more general union, which culminated eventually in the Zollverein. Soon after the accession of Louis II., political riots followed the French revolution of 1830, which were quelled by the army. The revolution of 1848 extorted from the grand duke the concession of the trial by jury. He appointed his son as coregent, March 5, 1848. He died June 16, and his son, the present grand duke Louis III. (born June 9, 1806), succeeded him. In March, 1866, the landgraviate of Hesse-Homburg, the reigning dynasty being extinct, was united with Hesse-Darmstadt. In June of the same year Hesse-Darmstadt joined Austria and the majority of the federal diet in the war against Prussia. In September it concluded a separate peace with Prussia, in which it engaged to pay an indemnification of \$1,200,000 to Prussia, and to cede the former landgraviate of Hesse-Homburg, and a small portion of its other territory, in exchange for which it received a few places which formerly belonged to Hesse-Cassel and Nassau. It also joined the North German confederation for that part of its territory which is situated north of the river Main. A special military convention with Prussia, by which the army of Hesse became a part of the army of the North German confederation, was concluded in April, 1867. In 1870 Hesse-Darmstadt, like the other states of South Germany, joined Prussia in the war against France, and in November it entered the German empire, then forming, for its entire territory. In 1871 the unpopular prime minister Dalwigk was dismissed. The history of Hesse-Darmstadt has been written by Walther (1841) and Steiner (5 vols., 1833-'4).

HESSE, Adolph Friedrich, a German organist, born in Breslau, Aug. 30, 1809, died there, Aug. 5, 1863. His father was an organ builder, and the son acquired at the factory a knowledge of the instrument, and when but nine years of age excited astonishment by his precocity as an organist. In 1827 he was appointed assistant organist at the church of St. Elizabeth. In 1828 and 1829 he made a concert tour through Germany, forming the acquaintance of Spohr and Rink, from the latter of whom he received valuable counsels. In 1831 he became first organist of the church of St. Bernardin. In 1844 he went to Paris for the inauguration of the great organ of St. Eustache. His reputation was that of one of the first organists of Europe. His compositions are about 80 in number, including six symphonies, an oratorio, five overtures, and many

compositions for the organ, severe in style but of great merit.

HESSE. I. Nicolas Auguste, a French painter, born in Paris in 1795, died in 1869. He studied under Baron Gros and in Rome, having gained the grand prize in 1868, acquired celebrity by his religious paintings, and succeeded Delacroix in 1863 in the academy of fine arts. His best works are in various churches. **II. Alexandre Jean Baptiste**, a French painter, nephew of the preceding, born in Paris in 1806. He became known in 1833 by his picture executed at Venice representing the funeral honors paid to Titian, and in 1867 he succeeded Ingres in the institute. His "Adoption of Godfrey of Bouillon by the Emperor Alexander Comnenus" (1842) is at Versailles, and one of his best pictures, the "Triumph of Pisani" (1847), is in the Luxembourg. His mural paintings for the chapel of St. Francis of Sales in the Paris church of St. Sulpice are esteemed.

HESSE-CASSEL (Ger. *Kurhessen*, Electoral Hesse), a former German electorate, incorporated with Prussia in 1866. At the time when it ceased to be an independent state it had an area of 3,701 sq. m., and a population, according to the census of 1864, of 745,063. The principal towns were Cassel, Marburg, Fulda, Hanau, Hersfeld, Schmalkalden, and Rinteln. Hesse-Cassel was the elder branch of the Hesse dynasty, and was founded by the eldest son of Philip the Magnanimous, the landgrave William IV., surnamed the Wise (1567 to 1592). His grandson, William V., took part on the Protestant side in the thirty years' war, and his widow after the restoration of peace obtained the greater part of Schaumburg and other territory. William VII. was succeeded in 1670 by his brother Charles, while another brother, Philip, founded the branch of Hesse-Philippsthal. Charles's eldest son became, by his marriage with Ulrike Eleonore, king of Sweden in 1720. In 1730 he assumed the government of his native country as Frederick I., and was succeeded in 1751 by his brother William VIII., who fought in the seven years' war on the side of Prussia. His son, the notorious Frederick II., became a convert to the church of Rome, and between 1776 and 1784 received over £3,000,000 by hiring his soldiers to the English government to fight against the Americans in the war of independence. He died in 1785, and was succeeded by his son William IX., who after 1803, when he was raised to the rank of an elector, reigned under the name of William I. Although recognized by Napoleon as one of the neutral princes in 1806, he was expelled from his possessions after the battle of Jena, and Hesse-Cassel was incorporated with the kingdom of Westphalia. On his return to power in 1813, he restored the old order of things. He is identified with the rise of the Rothschilds, and was the father of the Austrian general Haynau, by his mistress Frau von Lindenthal. He was not popular with his subjects. On his death in 1821 he

was succeeded by his son, the elector William II., whose relations with his subjects became seriously complicated by his connection with the obnoxious countess of Reichenbach. Riots broke out in 1830. The countess left Cassel, and on Jan. 9, 1831, the elector promulgated the long promised liberal constitution. On the return of the countess fresh disturbances arose, which incensed the elector to such an extent that he also left Cassel. On his death in 1847 he was succeeded by his son, who had officiated as regent after his departure from Cassel, and who assumed the sovereignty under the name of Frederick William I. (born Aug. 20, 1802). Yielding in 1848 to the revolutionary demand for political reforms, but retracing his steps after the reaction had set in, he gave great dissatisfaction to the people, especially in 1850, when the unpopular minister Hassenpflug came into power as premier, and Haynau, a nephew of the Austrian general, as minister of war. So great became the excitement that the elector fled, and Hassenpflug saw no other means of saving the crown than by invoking the aid of the other German powers. By their interference quiet was restored, and by their negotiation a new constitution was promulgated in 1852, which met with much opposition on account of its illiberality. After protracted agitations on the subject, a proposal in favor of the reestablishment of the old constitution was presented to the electors by a vote of the second chamber in November, 1859. During the war excitement in 1859, the chambers unanimously voted to join the Austrians against Napoleon III. On May 30, 1860, the government, in accordance with a resolution of the federal diet and with the wishes expressed by the first chamber, promulgated the constitution of 1852, with the amendments adopted in 1857 and with a new electoral law. The new second chamber protested against the constitutionality of the new electoral law and the validity of the new constitution, and on June 21, 1862, the federal diet, on motion of Prussia and Austria, enjoined upon the government of Hesse-Cassel the reintroduction of the liberal constitution of 1831 and the old electoral law of 1849. The government of Hesse-Cassel at first seemed disposed to refuse; but when Prussia mobilized an army corps, it submitted. Still the quarrels between the government and the legislature continued without interruption. At the outbreak of the war of 1866, the government of Hesse-Cassel sided with Austria, while the diet demanded that the electorate should remain neutral. Immediately after the declaration of war, in June, the Prussians took possession of the country; and when the elector refused to join the new confederation proposed by Prussia, he was taken as a prisoner to Stettin. A decree of Aug. 17 incorporated the electorate of Hesse-Cassel with the dominions of Prussia. In September, 1868, the ex-elector sent a memorial to all the courts of Europe, in which he protested against the forcible an-

nexation of his state to Prussia, but without effect. In 1873 the elector formally agreed to the cession of his territory to Prussia, and also renounced his right to the revenues of the electorate, the Prussian government granting him as compensation 2,000,000 thalers annually. —Histories of Hesse-Cassel have been written by Rommel (10 vols., 1828-'58), Wippermann (1850), and Röth (1855). (See Hesse, and Hesse-Nassau.)

HESSE-DARMSTADT. See HESSE, II.

HESSE-HOMBURG, a former German landgraviate, consisting of the province of Homburg, which was surrounded by the territory of Nassau, Hesse-Darmstadt, Hesse-Cassel, and Frankfort, and of the more populous province of Meisenheim, which lay between Rhenish Prussia, the Bavarian Palatinate, and the Oldenburg principality of Birkenfeld; total area, 106 sq. m.; pop. in 1864, 27,374, of whom 3,000 were Roman Catholics, about 200 Jews, and the rest Protestants. The little state was known abroad chiefly for the gambling tables at the watering place of Homburg, the capital. It belonged formerly to Hesse-Darmstadt, and became an independent territory in 1596, when it was allotted to Frederick I. by his father George I. In 1815 Meisenheim was added to its territory. In 1830 disturbances broke out consequent upon the French revolution. In 1835 the landgrave joined the Zollverein. A liberal constitution was promulgated in 1848, but withdrawn in 1852. The last landgrave, Ferdinand, died on March 24, 1866, when the country reverted to Hesse-Darmstadt.

HESSE-NASSAU, a province of Prussia, consisting of the former electorate of Hesse-Cassel, the former duchy of Nassau, and the former free city of Frankfort, all of which were annexed to Prussia in 1866, and a few small districts which were ceded by Bavaria and the grand duchy of Hesse. It is bounded by the provinces of the Rhine, Westphalia, Hanover, and Saxony, by Waldeck, Brunswick, the Thuringian states, the grand duchy of Hesse, and Bavaria; area, 6,021 sq. m.; pop. in 1871, 1,400,370, of whom 491,933 were Protestants, 371,736 Roman Catholics, and 36,390 Jews. It is divided into the districts of Cassel and Wiesbaden. The chief towns are Frankfort, Cassel, Marburg, Fulda, and Wiesbaden. The principal rivers are the Main, with its affluent the Kinzig, the Rhine, on the western and southern frontiers, with the Lahn, and the Weser with the Fulda. The surface is mainly mountainous, the chief mountains being the Spessart, Rhön, Westerwald, Taunus, and offshoots of the Vogelgebirge, but it nowhere exceeds a height of 3,000 ft. Prominent among the productions are wine and wood; agriculture and cattle raising are extensively carried on. Among the manufactures, those of cloth, jewelry, iron, and pottery are the most flourishing. The province is noted for the large number of its watering places, the best known of which are Ems, Soden, Wies-

baden, Schlungenbad, and Schwalbach. The province was formed in December, 1868. (See HESSE-CASSEL, NASSAU, and FRANKFORT.)

HESSIAN FLY, a small gnat or midge, of the order *diptera*, family *cecidomyiadae* or gall gnats, and genus *cecidomyia* (Latr.). It was called Hessian fly from the supposition that it was brought to this country in some straw by the Hessian troops during the revolutionary war; it was scientifically described in 1817 by Mr. Say as *cecidomyia destructor*. The body is about one tenth of an inch long, and the expanse of wings one quarter of an inch or more; the head, antennae, thorax, and feet are black; the hind body is tawny, marked with black on each ring, and with fine grayish hairs; the wings are blackish, tawny at the narrow base, fringed with short hairs, and rounded at the tip; the legs pale red or brownish; the egg tube rose-colored. The antennae are long, with bead-like swellings most distinct in the male, surrounded by whorls of short hairs, with 15 to 18 joints, globular in the male, oblong oval in the female; the proboscis is short, without piercing bristles; eyes kidney-shaped; legs long and slender, with the first joint of the feet short; and the wings with few veins. This insect, so destructive in some seasons in the fields of wheat, barley, and rye, generally matures two broods in the course of a year, appearing in spring and autumn, earliest in the southern states; the transformations of some are retarded in various ways, so that their life from the egg to the perfect insect may be a year or more, rendering the continuance of the species in after years more sure. The eggs, about $\frac{1}{6}$ of an inch long, translucent, and pale red, are placed in the longitudinal creases of the leaves of both winter and spring wheat very soon after the plants are above the ground, to the number of 20, 30, or more on a leaf; if the weather be warm, they are hatched in four or five days, and the larvæ, small footless maggots, tapering at each end, and of a pale red, crawl down the leaf and fix themselves between it and the main stalk, just below the surface of the ground, there remaining head downward till their transformations are completed, nourished by the juices of the plant, which they obtain by suction. Two or three larvæ thus placed will cause the plant to wither and die. In about six weeks they attain their full size, $\frac{3}{8}$ of an inch long, when the skin gradually hardens and becomes of a bright chestnut color, about the 1st of December in the autumn brood, and in June or July in the spring brood. In the beginning of this, the pupa state, they look



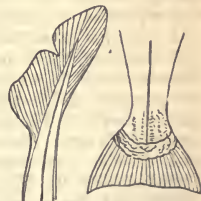
Hessian Fly (*Cecidomyia destructor*), enlarged.

like flax seed; in two or three weeks the insect within becomes detached from the leathery skin, and lies loosely in it, a motionless grub; within this it gradually advances toward the winged state about the end of April or beginning of May, according to the warmth of the weather. When mature, it breaks through this case, enveloped in a delicate skin, which soon splits on the back, setting the perfect insect at liberty. Many of those laid by the spring brood are left in the stubble, and remain unchanged until the following spring; some, however, do not get so low on the stalk as to be out of the way of the sickle, and thus with the straw may be transported long distances, and might have been brought in the flax-seed state across the Atlantic from Europe. The perfect insects, though small, are active and fly considerable distances in search of fields of grain. The insect supposed to be the Hessian fly, which Miss Morris found laying its eggs in the seeds of wheat instead of on the leaves, she afterward ascertained to be another species, which she called *C. culmicola*. This destructive insect was first observed in 1776 on Staten island, near the place of debarkation of the Hessian troops under the command of Sir William Howe; thence it spread to Long Island, southern New York, and Connecticut, proceeding inland at the rate of about 20 miles a year; it was seen at Saratoga, 170 miles from Staten island, in 1789, and west of the Alleghanies in 1797; so great was the destruction, that the cultivation of wheat was abandoned in many places. Burning the stubble in wheat, rye, and barley fields, afterward ploughing and harrowing the land, appears to be the best method of getting rid of this insect; steeping the grain, rolling it in plaster or lime, or other methods of securing a rapid and vigorous growth, sowing the fields with wood ashes and feeding off the crop by cattle in the autumn, are useful accessory means. Various minute parasitic insects, of the hymenopterous order, similar in their habits to the ichneumon flies, destroy a very large proportion of every generation of the Hessian fly, preying upon their eggs, larvæ, and pupæ. The insect which commits such depredations on the wheat crops of Great Britain, *C. tritici* (Kirby), will be described under WHEAT FLY. For details on the history, habits, and transformations of the Hessian fly, the reader is referred to "Insects Injurious to Vegetation," by Dr. T. M. Harris.

HESYCHIUS. I. **Saint**, an Egyptian bishop, born about the middle of the 3d century, died in Alexandria in 311. He published an edition of the New Testament mentioned by St. Jerome, as well as a revised edition of the Septuagint, both of which were in general use throughout Egypt and the neighboring countries. He suffered martyrdom in the persecution begun by Diocletian, shortly before its termination. II. **Of Alexandria**, a Greek lexicographer, born in Alexandria about 350. His personal history is unknown. He left a lexicon

considered to be of inestimable value. Some critics say that this work is based on a lexicon composed in the 1st century by Pamphilus of Alexandria, and abridged later by Diogenianus. One manuscript of the work exists in St. Mark's library at Venice; and according to Kopitar (*Hesychii Glossographi Discipulus Russus*, Vienna, 1839), inedited manuscripts of St. Cyril of Alexandria in several European libraries reproduce the work of Hesychius. The first edition was that of Musurus (Venice, 1514); the best is that of Johann Alberti and David Ruhnken (Leyden, 1746-1766; reëdited by Schmidt, 4 vols. 4to, Jena, 1857-'64). III. **Of Jerusalem**, a Greek ecclesiastical writer, born in Jerusalem, died in Constantinople about 484. He was educated in his native city, and ordained priest in Constantinople, where he spent the remainder of his life. His principal works are: *In Leviticum Libri VII* (Latin, Basel, 1527; Paris, 1581; the Greek text is lost); *Στιχηρὸν* (or *Κεφάλαια*) *τῶν ὑβ' Προφητῶν καὶ Ὑσάων* (Augsburg, 1602); *Ἡ Ἐναγγελικὴ Συμφωνία* (in Combefis's *Græco-Latinæ Patrum Bibliothecæ Novum Auctarium*, Paris, 1648). His complete works are published in vol. xciii. of Migne's *Patrologie grecque*. Among his lost works is a church history. IV. **Of Miletus**, called the Illustrious, a Greek historian, born at Miletus in Ionia about 470, died about 530. Very little is known of his life. His only existing work is one on celebrated teachers, *Περὶ τῶν ἐν Παιδείᾳ λαμπραντῶν* (Antwerp, 1572, with a translation by Hadrianus Junius). Meursius in his *Hesychii Opuscula* (Leyden, 1613; Leipzig, 1820) published a fragment, *Πάρρια Κωνσταντινουπόλεως*, believed to be the 6th book of a universal history from Belus to the end of the reign of Anastasius I., 518. Photius and Suidas mention this work with praise.

HETEROCERCAL. All palæozoic and most mesozoic fishes had a vertebrated tail, the vertebræ extending to its extremity, instead of stopping short at its commencement as in almost all existing fishes. As the vertebral column extended into the upper lobe of the tail, the two lobes were unequal, sometimes very much so; hence such were called by Agassiz heterocercal or uneventailed fishes, while those of the ordinary form, the even-tailed, were called homocercal. The placoids (selachians or sharks) and the ganoids (sturgeons and gar pike), both the



1. Heterocercal (Shark).
2. Homocercal (Salmon).

extinct and living species, had heterocercal tails; while ordinary fishes (stenoids and cycloids), from the oölite to the present time, have the lobes of the tail nearly or quite equal. This has been regarded as a mark of the sauroid character of the early fishes; with other peculiarities, it indicates the high position of

these ancient but seemingly prophetic types, and is among the facts that are difficult to explain on the Darwinian theory of development.

HETEROPODA. See NUCLEOBRANCHIATES.

HETEROPTERA. See HEMIPTERA.

HETMAN. See ATTAMAN.

HEUGLIN, Theodor von, a German traveller, born at Hirschlanden, Württemberg, March 20, 1824. He studied natural history and pharmacy, travelled through Europe, and went in 1850 to Egypt, and explored Arabia Peträa and the shores of the Red sea. Having been appointed in 1852 secretary to Dr. Reitz, Austrian consul at Khartoom, he accompanied him to Abyssinia. Reitz having died, Von Heuglin succeeded him as consul, and continued his explorations in the region of the White Nile. In 1856 he visited Greece and the shores of Asia Minor, and in 1860 he took charge of an expedition in search of the traveller Edward Vogel. After searching in the Galla country and parts of Abyssinia, he returned to Khartoom in July, 1862. Early in 1863 he set out with Steudner to reexplore the course of the White Nile. In 1865 he returned to Europe. In 1870-'71 he made an exploration of Spitzbergen and Nova Zembla, the general results of which are given by Spörer in Petermann's *Mittheilungen* for 1873. His works include *Reisen in Nordostafrika* (Gotha, 1857); *Reise nach Abessinien und den Gallaländern* (Jena, 1868); *Ornithologie Nordostafrikas* (Cassel, 1868 et seq.); and *Reise in das Gebiet der westlichen Zuflüsse des Weissen Nil* (Leipsic, 1869).

HEVELIUS (HEWEL, or HEWELKE), **Johannes**, a Polish astronomer, born in Dantzig, Jan. 28, 1611, died there, Jan. 28, 1688. He was of noble birth, studied at Leyden, applied himself to improving optical instruments, and established in his house a private press from which most of his works were issued. He was chosen councillor in 1651. In 1641 he constructed an observatory, called Stellæburgum, which he provided with instruments chiefly of his own manufacture. In 1679 he was visited by Halley, whom the royal society of London had requested to examine his observations. In that year his observatory was burned down, with his library and many of his manuscripts. He soon rebuilt it, and continued his astronomical pursuits till his death. As an observer he ranked next to Flamsteed among the astronomers of his age. His works include *Selenographia* (1647), *Cometographia* (1668), *Machina Cælestis* (1673-'9), *Firmamentum Sobiescianum* (1690), and *Prodromus Astronomiæ* (1691).

HEVES. I. A central county of Hungary, bordering on the counties of Gömör, Borsod, Szabolcs, Békés, Csongrád, and Pesth; area, 2,546 sq. m.; pop. in 1869, 332,613, of whom the great majority were Magyars. It is watered by the Theiss, Zaggya, Erlau, and Tarna. Its chief products are wine, corn, and tobacco; and it has a considerable manufacturing industry and a brisk trade. Capital, Erlau.

II. A town of the preceding county, 55 m. E. N. E. of Pesth; pop. in 1869, 5,703. The inhabitants produce wine, corn, and tobacco.

HEWES, Joseph, one of the signers of the Declaration of Independence, born at Kingston, N. J., in 1730, died in Philadelphia, Nov. 10, 1779. He was educated at Princeton college, and went to Philadelphia to engage in mercantile business. About 1760 he removed to North Carolina, and settled in Edenton, and in 1774 was sent as a delegate to the general congress at Philadelphia. Soon after taking his seat he was appointed on a committee to "state the rights of the colonies in general, the several instances in which those rights are violated or infringed, and the means most proper to be pursued for obtaining a restoration of them," and aided in the preparation of its report. The congress adjourned in October, and a new one met in the succeeding May, of which Mr. Hewes was again chosen a member, and served on many important committees during 1775-'6. In 1777 he declined a reelection, but resumed his seat in July, 1779.

HEYDEN, Jan van der, a Dutch painter, born at Gorkum about 1637, died in Amsterdam in 1712. His best works represent the most picturesque views and public buildings of Amsterdam and other cities of the Netherlands, Germany, and England. He was a master of chiaroscuro and perspective, and his paintings were generally embellished with figures by Adrian van der Velde and by Lingelbach. The finish of his productions was remarkable. He was director of fire-extinguishing companies, and in 1690 published an illustrated work on his improvements in fire engines.

HEYLIN, Peter, an English theologian, born in Burford, Oxfordshire, in 1600, died in London, May 8, 1662. He was educated at Oxford, read lectures on history and geography, was made D.D., and in 1629 was nominated, at the request of Laud, one of the chaplains in ordinary to the king. He was a zealous royalist, and in the time of the rebellion his property was confiscated by the parliament, and he himself was obliged to fly to Oxford, where he edited the journal called *Mercurius Aulicus* till 1645. On the restoration he was appointed sub-dean of Westminster by Charles II. His writings comprise about 37 works, chiefly on church history and polemics. Some of them passed through several editions, and his "Ecclesia Restaurata, History of the Reformation of the Church of England," with his life by his son-in-law John Barnard, D.D., was reprinted in 1849 (2 vols. 8vo, Cambridge).

HEYNE, Christian Gottlob, a German philologist, born in Chemnitz, Saxony, Sept. 25, 1729, died in Göttingen, July 14, 1812. He studied philology and the classics at Leipsic, and afterward obtained at Dresden a situation as under secretary in the library of the minister Brühl, where he became intimate with Winckelmann, then a young, poor student like himself. In 1763 he was appointed to fill the chair of elo-

quence and poetry in the university of Göttingen, and he remained connected with that institution till his death. He published his views on the manner of studying the ancient authors in his edition of the *Apollodori Bibliotheca* (4 vols., Göttingen, 1782), and in several essays, which appeared in the "Transactions of the University of Göttingen." He was made chief librarian of the library of Göttingen, perpetual secretary of the royal society, and foreign member of the institute of France. Both as a teacher and writer he powerfully contributed toward the dissemination of a profound and philosophical knowledge of antiquity. He published editions of Tibullus (Leipsic, 1755), Epicetetus (1756), Virgil (4 vols., 1767-'75), Pindar (2 vols., Göttingen, 1773-'4), the Iliad (8 vols., Leipsic, 1802), Diodorus Siculus, and other classic authors. His life has been written by his son-in-law Heeren.

HEYSE, I. Karl Wilhelm Ludwig, a German philologist, born in Oldenburg, Oct. 15, 1797, died in Berlin, Nov. 25, 1855. He was for eight years a teacher in the family of Mendelssohn-Bartholdy, and subsequently was a professor at the university of Berlin. He prepared new editions of popular German grammars and dictionaries by his father, Johann Christian August (1764-1829), and published several similar works. His most valuable contribution to philology was edited after his death by Steindthal under the title of *System der Sprachwissenschaft* (Berlin, 1856). **II. Johann Ludwig Paul**, a German author, son of the preceding, born in Berlin, March 15, 1830. He studied in Berlin, Bonn, and Italy, and in 1854 became a permanent resident of Munich, at the request of the king Maximilian II. He married in the same year a daughter of the art historian Kugler. Numerous collections of his novels in verse and prose have appeared, and some of them have been translated into English. A fifth edition of his *Neue Novellen* was published in 1874. One of his finest poems is *Thekla* (Stuttgart, 1858), and his best known plays are *Franziska von Rimini* (Berlin, 1850), *Die Sabinerinnen* (1859), and *Ludwig der Bayer* (1866), contained in his *Dramatische Dichtungen* (6 vols., 1870). His latest and best novel is *Die Kinder der Welt* (1873).

HEYWARD, Thomas, one of the signers of the Declaration of Independence, born in St. Luke's, S. C., in 1746, died in March, 1809. After completing his classical and legal studies in London, he returned home, and began the practice of the law. He was a member of congress in 1775-'6, was appointed judge in 1778, and the next year was reelected to congress. In 1780 he was made a prisoner in Charleston, where he had commanded a body of militia, and was sent to St. Augustine. He continued in public life as a judge till 1798.

HEYWOOD, a town of Lancashire, England, on a branch of the Manchester and Leeds railway, 8 m. N. of Manchester; pop. in 1871, 21,248. It has extensive and flourishing manu-

factories of cotton; there are also machine and boiler works, iron founderies, and paper mills.

HEYWOOD, John, an English humorist, born probably at North Mims, near St. Albans, in the early part of the 16th century, died in Mechlin in 1565. He was educated at Oxford, and became a favorite of Henry VIII, and subsequently of Queen Mary. He is the author of a number of humorous "interludes," the best known of which, perhaps, is "The Four P's," and of a burlesque allegory called "The Spider and the Fly." From his "Six Centuries of Epigrams," he has been called the epigrammist. A new edition of his "Proverbs," by Julian Sharman, was published in London in 1874.

HEYWOOD, Thomas, an English dramatist, born in Lincolnshire in the latter half of the 16th century, died about 1650. He was educated at Cambridge, and was an actor as well as a writer. He wrote the whole or the greater part of 220 plays, of which but 23 survive. Some of them, such as "A Woman Killed with Kindness" and "The Four London Prentices," are not inferior to the productions of Massinger, Ford, and others of his contemporaries. Charles Lamb calls him "a sort of prose Shakespeare." The first complete edition of his dramatic works was published in 1874 (6 vols., London).

HEZEKIAH, king of Judah, succeeded his father Ahaz about 727 B. C., when he was 25 years old, died about 698. Following the injunctions of the prophet Isaiah, on his accession he took measures to break up the idolatrous customs into which the people had fallen during the life of his father, and to repair the losses and defeats they had suffered. Early in his reign the Assyrians invaded the neighboring kingdom of Israel, and carried away the ten tribes to provinces beyond the Tigris; but notwithstanding the power and threats of the conquerors, Hezekiah refused to acknowledge subjection to Assyria, or to pay the tribute which had been imposed and paid during the reign of his father. In consequence of this, the Assyrian king Sennacherib invaded his kingdom; but after various exploits his army met with a sudden destruction, and the survivors precipitately retreated. About this time he was seized by a dangerous illness, the unexpected recovery from which he celebrated in a poetical "writing" preserved in the book of Isaiah (xxxviii.). A messenger having been sent by the king of Babylon to compliment him on his restoration to health, the king of Judah displayed before him his accumulated treasures; and for this he was informed by Isaiah that from Babylon, and not from Assyria, would come the ruin and captivity of Judah. He ended his reign in peace.

HIACOOMES, the first Indian convert to Christianity in New England, born about 1610, died in Martha's Vineyard about 1690. He was converted under the preaching of the missionary Thomas Mayhew, and having been taught to read, he began in 1653 to preach to his

brethren in Martha's Vineyard. He succeeded in making a number of converts among them, notwithstanding the menaces directed against him by the Indian priests. In August, 1670, an Indian church was formed at Martha's Vineyard, and Hiacoomes became its pastor.

HIBBARD, Freeborn Garretson, an American clergyman, born in New Rochelle, N. Y., Feb. 22, 1811. At the age of 18 he entered the ministry of the Methodist Episcopal church in the New York conference, and continued in this work, chiefly in western New York, from 1830 to 1860, when he was elected editor of the "Northern Christian Advocate" at Auburn. In 1864 he resumed the active pastorate. Dr. Hibbard's principal works are: "Baptism, its Import, Mode, Efficacy, and relative Order" (New York, 1841); "Geography and History of Palestine" (1845); "The Psalms, chronologically arranged, with Historical Introductions, and a General Introduction to the whole Book" (1852); and "The Religion of Childhood, or Children in their Relation to Native Depravity, to the Atonement, to the Family, and to the Church" (1864). He has also edited "The Works of the Rev. Leonidas L. Hamline, D. D." (1872).

HIBERNATION (Lat. *hibernare*, to stay in winter quarters), generally understood as the condition of lethargy, in which many animals pass the cold season. The sources of their daily food being at this time cut off, they sink into a deep sleep, in which nutriment is unnecessary, and so remain until the warm weather of spring; a remarkable provision for the preservation of animals which would otherwise perish from cold and hunger. Among the animals in which this state has been noticed are the bat, hedgehog, dormouse, hamster, marmot, and other rodents; chelonians, saurians, ophidians, and batrachians; and some fishes (like the eel), mollusks, and insects. The phenomena of hibernation, however, are not confined to the winter season, and are not necessarily connected with a low degree of external temperature; the bats, in the summer time, present these phenomena regularly every 24 hours; the tenrec, a nocturnal insectivorous mammal, though living in the torrid zone, according to Cuvier, passes three of the hottest months of the year in a state of lethargy. The influence of cold in producing this state is due only to its tendency to cause sleep, and if carried too far, instead of inducing the physiological condition of hibernation, leads to the pathological one of torpor, and even death. According to Marshall Hall ("Cyclopædia of Anatomy and Physiology," article "Hibernation"), the quantity of respiration is inversely as the degree of irritability of the muscular fibre, the former being measured by the amount of oxygen inspired, and the latter by that of the galvanic force necessary to demonstrate its existence. Birds have a high respiration and a low muscular irritability; reptiles, on the contrary, have a high degree of irritability and a

low respiration. This is true also of the progressive development of animals from the immature to the perfect state, in which the change is from a lower to a higher respiration, and from a higher to a lower muscular irritability. In sleep, and especially in the profound sleep of hibernation, the respiration is diminished and the irritability increased. Sleep and hibernation are similar periodical phenomena, differing only in degree, and the latter is extraordinary only because less familiar than the former; the ordinary sleep of the hedgehog and dormouse, and of the bat in summer, is a diurnal hibernation, ceasing daily at the call of hunger, and accompanied by a diminution of respiration and animal heat; and this sleep may pass into true hibernation as the blood becomes more venous in the brain, and the muscular fibres of the heart acquire increased irritability. In perfect hibernation the process of sanguification is nearly or entirely arrested; the bat takes no food, and passes no excretions from the intestines or kidneys; but the dormouse awakes daily, and the hedgehog every two or three days, in a temperature of 40° to 45° F., and they take food and pass excretions, and subside again into their lethargy. Respiration is also very nearly or entirely suspended in perfect hibernation, as has been experimentally proved by the absence of all external respiratory acts, by the unchanged condition of the surrounding air, by the diminution of the animal heat to that of the atmosphere, and by the capability of supporting the entire privation of air or the action of carbonic acid and other irrespirable gases. The circulation, though very slow, is continuous, and the heart beats regularly; the blood, from the absence of respiration, is entirely venous, but the increased muscular irritability of the left ventricle of the heart permits it to contract under the slight and usually insufficient stimulus of a non-oxygenated blood; it is the exaltation of this single vital property which preserves life and renders hibernation possible, forming the only exception to the general rule of the circulation in animals which possess a double heart; the slow circulation of a venous blood keeps up a state of lethargy induced by a diminished respiration. Sensation and volition are quiescent, as the brain and its sensory ganglia are asleep, but the true spinal or excitomotor system is awake and its energies are unimpaired, as is shown by the facility with which respiration is excited by touching or irritating the animal; muscular motility is also unimpaired in this state; the action of the heart has been found to continue about ten hours in an animal in the state of hibernation, in which the brain had been removed and the spinal marrow destroyed, while in the same animal in a natural state it ceases after two hours. With such an irritable condition of the heart, the introduction into it of an arterial or oxygenated blood from respiration would soon cause death from over stimulation; and as trifling causes are sufficient

to excite the respiratory act, hibernating animals adopt various means of securing themselves from disturbance; bats retire to the recesses of gloomy caverns, where they hang suspended by the claws of the hind feet, head downward; the hedgehog and the dormouse roll themselves into a ball; tortoises burrow in the earth, frogs and eels plunge under the mud, and snakes twist themselves together in natural or artificial crevices and holes in the ground. The call of hunger and the warmth of returning spring arouse all these from their winter retreats, the irritability gradually diminishing as the respiration becomes active. Extreme cold will rouse a hibernating animal from its lethargy and speedily kill it; hence many animals congregate in carefully prepared nests, and others, like the snakes, entwine themselves for mutual protection from cold. The state of hibernation, or that in which the stimulus of venous blood is sufficient to continue the heart's action, finds a parallel in some cases of disease accompanied by lethargy, in which revival has occurred after supposed suspended animation, and in others in which actual death has been delayed for days after the apparent cessation of respiration and circulation; the causes of this condition, which might throw much light on the kinds and phenomena of death, have not been fully investigated in the human subject. The torpor produced by extreme cold, though sleep be always induced, is very different from true hibernation; the former is attended with diminished sensation and rigidity of the muscles, and if prolonged ends in arrest of the circulation and death; the latter, in which sensation and motility are unimpaired, has for its object the preservation of life; the hibernating bat or dormouse is aroused from its sleep by too great cold, and is destroyed by it like any other animal. Most animals lay up a store of fat under the skin, which is slowly absorbed during hibernation; in the frogs, and probably in many reptiles, the adipose accumulation takes place within the abdominal cavity in the folds of the peritoneum, for a similar purpose. The phenomena of insect hibernation are very interesting in all stages of growth; many pass the winter in this condition, both above and beneath the surface of the ground; eggs and chrysalids have been known to withstand a temperature several degrees below the freezing point of water. It is well known that many species of fish may become stiff from cold and yet not perish, but actual congelation is fatal; in the so-called frozen fishes which have revived in warm water, there must have been a low degree of vital action in the organs of circulation. In batrachians the necessary respiration may be effected entirely through the skin, in the hibernating state. The lower animals generally seem to possess a remarkable power of resisting cold, and may be reduced to a condition of apparent death, without the irritability of hibernation, and yet not identical with the torpidity usually produced by cold.

HIBERNIA. See IRELAND.

HIBISCUS, the rose mallow, a genus of *malvaceae*, the mallow family, which differs from the common representatives of that family in having its fruit a pod, which is five-celled, and at maturity splits through the five valves without leaving a central axis. The flowers, which are large and showy, have the general structure peculiar to the order, as in the single hollyhock; immediately beneath the calyx is an involucre of numerous narrow bracts. The genus includes about 150 species of herbs, shrubs, and even trees, and is more abundant in tropical than temperate climates. The name is an ancient one of obscure meaning. The most common native species along the Atlantic coast is *H. Moscheutos*, the swamp rose mallow, which is often very abundant in brackish marshes and along rivers far beyond the reach of salt water; it is also found inland in the vicinity of salt springs. As it grows



Hibiscus Moscheutos.

from 4 to 7 ft. high, and has numerous pink (rarely white) blossoms 5 or 6 in. across, it is one of the most noticeable of midsummer flowers. The three-lobed leaves are downy and soft to the touch. This is an herbaceous species, sometimes cultivated in gardens, and by nurserymen under the name of *H. palustris*. Like other plants of the family, this has a strong fibrous inner bark, and about ten years ago there was an attempt at speculating in the seeds and plants at high prices under the name of American jute. It was asserted that it could be profitably cultivated for its fibre, which was said to be as valuable as jute; but it has not yet found a place among the fibres of commerce. *H. grandiflorus*, with flowers a foot wide, *H. militaris*, with halberd-shaped leaves, and *H. coccineus*, with large bright scarlet flowers, are among the tall-growing native species found in the southern states. *H. trionum*, the bladder-ketmia or flower-of-

an-hour, a smaller European species, has sulphur-yellow flowers with a blackish eye, and was formerly cultivated in gardens, where it became naturalized and now remains as a weed. *H. esculentus* is cultivated for its edible pods. (See OKRA.) The best known of the shrubby species is *H. Syriacus*, which was introduced into cultivation from the Levant over two centuries ago. It is known in gardens and nursery catalogues as the shrubby althæa, the old name for it being *althæa frutex*; it is also called rose of Sharon, a name that appears to be peculiar to this country. If left to itself, this will form a tall unshapely shrub 10 ft. or more high, with long swaying branches; it is usually kept closely pruned, and when cut back severely produces a profusion of flowers, which are like those of the hollyhock, but smaller; there are double varieties, which, as well as the single, range in color from white to deep purple. As it blooms late in summer,



Rose of Sharon (*Hibiscus Syriacus*).

will grow in almost any soil, and presents such a great variety in its flowers, it is justly regarded as one of the most valuable ornamental shrubs. There is a variety with its leaves distinctly margined with white, but it does not flower freely. Two woody species are found in Florida: *H. Floridanus*, 4 or 5 ft. high, and *H. tiliaceus*, a large tree. Some of the greenhouse species are very showy, the most common of which is *H. rosa Sinensis*, the rose of China; it is from the East Indies, where its brilliant scarlet flowers are used to black shoes; there are white, purple, rose-colored, and other varieties of it.

HICCOUGH, a spasmodic contraction of the diaphragm, producing a shock in the thoracic and abdominal cavities, and accompanied by a convulsive inspiration in which the column of air is arrested by the sudden closing of the glottis, and by a loud and well known clucking

sound. Authors are not agreed as to the origin of this act, but the movement is undoubtedly of a purely reflex character; though the spasmodic action be in the diaphragm, its point of departure may be in the abdominal organs or in the nervous centres. In ordinary cases it comes and goes spontaneously, and is a matter of no consequence beyond a slight inconvenience under certain circumstances; but it may be preceded by gastric symptoms, pain, and eructations, be accompanied by labored respiration, and be so persistent and severe as to require active treatment. It is often seen in children and in adults who have eaten or drunk immoderately or hastily, after long fasting, in diseases of the stomach, intestines, and liver, and in nervous persons troubled with flatulence; it becomes an important diagnostic sign in peritonitis, strangulated hernia, and other intestinal obstructions; it is not uncommon in intermittent fevers, and is a grave symptom in typhoid and gangrenous affections accompanied by other spasmodic phenomena. In nervous persons it may be brought on by any excitement, and generally disappears with its cause; if not, a few swallows of cold or acidulated water, cold sprinkling, or vivid emotion of any kind, will put an end to it in a few moments. Obstinate cases are on record, which required cold shower baths, ice externally and internally, narcotics, and revulsives to the epigastrium. When intermittent, it yields to quinine; if symptomatic, the nature of the disease will indicate its treatment.

HICKES, George, an English author, born at Newsham, Yorkshire, June 20, 1642, died Dec. 15, 1715. He studied at Oxford, and in 1664 was chosen fellow of Lincoln college. In 1675 he became rector of St. Ebbe, and in 1676 chaplain to the duke of Lauderdale, with whom he went the following year to Edinburgh. In 1682 he was made one of the king's chaplains, and in 1683 dean of Worcester. He was a violent Jacobite, refused to take the oath to William III. in 1689, and was deprived of all his benefices. He protested vehemently, by placard affixed to the door of Worcester church, and retired to London, where he remained for several years in concealment. In 1693 he was sent with a list of the nonjuring clergy to the exiled king at St. Germain, and in 1694 was consecrated suffragan bishop of Thetford by Archbishop Sancroft. His principal works are: *Institutiones Grammaticæ Anglo-Saxonicæ* (4to, 1689); *Antiquæ Litteraturæ Septentrionalis Thesaurus* (3 vols. fol., Oxford, 1703-'5); "The Christian Priesthood, and the Dignity of the Episcopal Order" (London, 1711; new ed., 3 vols., Oxford, 1847); *Bibliotheca Scriptorum Ecclesiæ Anglicanæ* (1709); and "Sermons" (2 vols., 1713).

HICKMAN. I. A W. central county of Tennessee, drained by Duck and Piney rivers; area, 550 sq. m.; pop. in 1870, 9,856, of whom 1,471 were colored. The surface is uneven,

and the soil rich and well watered. Iron ore is abundant. The chief productions in 1870 were 41,536 bushels of wheat, 514,554 of Indian corn, 34,202 of oats, 43,150 of peas and beans, 17,364 of Irish and 15,226 of sweet potatoes, 121,556 lbs. of butter, and 755 bales of cotton. There were 2,374 horses, 1,790 mules and asses, 2,600 milch cows, 4,438 other cattle, 6,927 sheep, and 23,793 swine; 1 manufactory of cotton goods, 2 flour mills, 5 tanneries, and 3 saw mills. Capital, Centreville.

II. A S. W. county of Kentucky, touching Tennessee on the S. E., separated from Missouri by the Mississippi river, and drained by several small streams; area, 220 sq. m.; pop. in 1870, 8,453, of whom 1,635 were colored. The surface is gently undulating, and the soil consists of rich mould with a substratum of sand. The Mobile and Ohio railroad passes through it. The chief productions in 1870 were 48,190 bushels of wheat, 350,860 of Indian corn, 570,287 lbs. of tobacco, 10,416 of wool, 53,650 of butter, and 308 bales of cotton. There were 1,385 horses, 858 mules and asses, 3,871 cattle, 5,010 sheep, and 13,948 swine. Capital, Clinton.

HICKOK, Laurens Perseus, an American metaphysician, born in Danbury, Conn., Dec. 29, 1798. He graduated at Union college in 1820, devoted himself to theology, was licensed as a preacher in 1822, and was pastor successively at Newtown, Kent, and Litchfield, till in 1836 he was elected professor of theology in the Western Reserve college, Ohio, where he remained eight years. In 1844 he became professor in the Auburn theological seminary, and in 1852 removed to Schenectady, N. Y., to become professor of mental and moral science and vice president of Union college. He became president of the college March 1, 1866, and resigned July 20, 1868, when he removed to Amherst, Mass., where he now (1874) resides. He has published "Rational Psychology" (8vo, Auburn, 1848); "Moral Science" (Schenectady, 1853); "Empirical Psychology, or the Human Mind as given in Consciousness" (1854); "Rational Cosmology" (New York, 1858); "Creator and Creation, or the Knowledge in the Reason of God and His Works" (Boston, 1872); and "Humanity Immortal, or Man Tried, Fallen, and Redeemed" (1872). He is now (1874) preparing for publication a work entitled "Rational Logic, or True Logic must Strike Root in Reason."

HICKORY (*carya*, Nuttall), the common name of several species of timber trees, with large compound leaves, having from 5 to 15, but usually not more than 11 leaflets. The hickories belong to the natural order of *juglandaceae*, which comprise but two other genera besides this and the walnuts. The flowers of the hickory are of two kinds: sterile, which are borne in compound catkins, each principal catkin having two opposite branches, the stamens from four to eight in each flower; and fertile, which are solitary or else in small groups

at the ends of the branches. The fruit is a large roundish nut, the husk of which opens partially or wholly of itself by four seams. The genus *carya* is exclusively American, and is distinguished from *juglans*, the walnuts, by several characters, the most noticeable of which is the splitting of the husk; this in the walnut dries up on the nut. There are nine or ten species, all of them remarkable for stateliness and general beauty. In the autumnal scenery the foliage of the hickories contributes a pleasing share, each species possessing its own peculiar hues and tints. As an ornamental tree the hickory can be recommended, but on account of the difficulty of transplanting it is seldom planted; it is best to plant the nuts where the trees are to stand, in spring, they having been kept buried all winter; two or three nuts are planted near together, and if all grow, all but one are removed. The hickory seldom survives when taken from the woods, as its roots are large, few in number, and easily killed. Attempts to graft the hickory are rarely successful; it has been accomplished by setting the graft just below the surface of the ground; the French nurserymen are said to succeed by herbaceous grafting, *i. e.*, the scion and stock are both of unripe wood. On account of the density and tenacity of the wood of the hickories, it has a wide application in the arts, and its uses are too many to enumerate; that furnished by the different species is so much alike that it is difficult to distinguish them; it is liable to the attacks of insects, and decays rapidly when exposed. As a fuel it excels all other northern woods; it makes a hard charcoal, and the ashes are very rich in potash. The fruit of the species vary much in size and form, and it is often impossible to distinguish them by one character alone. The bitter-nut hickory (*C. amara*, Nutt.) is the most graceful and remarkable for its finely cut foliage. It raises a noble columnar top to the height of 60 or 70 ft., enlarging upward, and broadest at 40 or 50. Its recent shoots are of an orange green, smooth and dotted with orange. Its fruit, however, is intensely bitter. It is the least valuable species. The pig-nut hickory



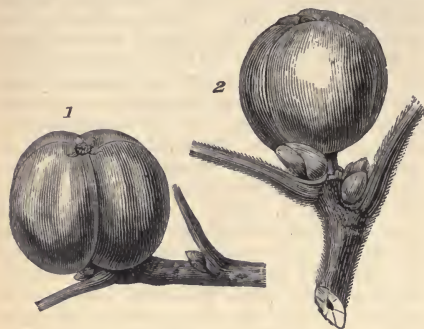
1. Pig Nut.



2. Bitter Nut

(*C. porcina*, Nutt.) is also a large tree, with a close bark and very tough and valuable wood; its sprouts are used as withes; the wood is preferred by many artisans to that of any other species; it is especially useful for axe helves and wagon axles. Its fruit is variable in size

and form, and is abundant, but of a disagreeable taste. The small-fruited hickory (*C. microcarpa*, Nutt.) grows in the moist woodlands of New York and southward, and its trunk rises to the height of 60 or 80 ft.; its fruit is small, but eatable. The mocker-nut hickory



Hickory.—1. Shell Bark. 2. Mockernut.

(*C. tomentosa*, Nutt.) is a fine stately tree of slow growth, with an erect trunk, forming at the summit a graceful pyramidal head of a few moderate-sized branches. The large round buds readily distinguish it from the next species. It is sometimes called white-heart hickory, although the wood in the old trees does



Mockernut (*Carya tomentosa*).

not differ in color from that of the other kinds. The nut varies greatly in the thickness of the shell and in form; one variety is called the square nut; the kernel is sweet, but is very difficult to extract, a fact which is supposed to have given the name mocker-nut.

The variety *maxima* (Nutt.) bears "fruit as large as an apple," with a very thick husk. The shell-bark or shag-bark hickory (*C. alba*, Nutt.) is easily distinguishable by its shaggy bark, its excellent fruit, and its rather small, ovate leaf buds. The shag-bark is a stately tree, rising to about 60 to 80 ft. Its branches are irregular and scattered; but when growing singly in open space, the tree attains much beauty and gracefulness. The delicious flavor of its fruit is not surpassed by any foreign nut. The nuts vary greatly; some individual trees have nuts with astonishingly thin shells, and were it not for the difficulty of grafting these might be propagated. Large quantities of the nuts, brought from districts where the species grows best, are readily disposed of in the markets. In the woods of Pennsylvania and westward to Illinois and Kentucky, the western shell-bark hickory (*C. sulcata*, Nutt.) is found, having nuts twice as large as the preceding, with a strong point at each end; the kernel is sweet, but of inferior flavor to that. The pecan hickory (*C. oliviformis*, Nutt.) is a more western and southern species. (See PECAN.) The nutmeg-fruited hickory (*C. myristiciformis*, Nutt.) is a rare and local species found in South Carolina, the fruit of which is very small, smooth, and brown, streaked with white, and strongly resembling a nutmeg; the kernel is of small size and little value.

HICKORY, a S. W. county of Missouri, intersected by the Pomme de Terre river, a tributary of the Osage; area, 408 sq. m.; pop. in 1870, 6,452, of whom 90 were colored. It has a moderately uneven surface, covered in some places by a good growth of timber, and a rich soil. The chief productions in 1870 were 43,696 bushels of wheat, 271,582 of Indian corn, 65,573 of oats, 16,715 of potatoes, 42,164 lbs. of tobacco, 105,040 of butter, and 3,292 tons of hay. There were 3,543 horses, 2,569 milch cows, 5,387 other cattle, 3,280 sheep, and 11,970 swine. Capital, Hermitage.

HICKS, Elias, an American preacher of the society of Friends, born in Hempstead, N. Y., March 19, 1748, died in Jericho, N. Y., Feb. 27, 1830. While a youth he manifested a talent for public speaking, and at the age of 27 was a well known preacher. For many years he labored zealously in advancing the generally accepted doctrines of the Friends; but having as he believed discovered errors in these tenets, he put forth views of his own which he defended with energy and ability. To advance these views he travelled extensively in the United States and in the British provinces, attracting large congregations by his oratory. The result was a schism in the body of Friends; those adhering to the old doctrines being specially termed orthodox, while the followers of Hicks were called after him Hicksites. (See FRIENDS.) He preserved his intellectual vigor till late in life, visiting when 80 years of age New Jersey, Pennsylvania, Maryland, Ohio, Indiana, and the north-

ern and western parts of New York. His theological writings were principally in an epistolary form.—See “Elias Hicks, Journal of his Life and Labors” (Philadelphia, 1828), and his “Sermons” (1828).

HICKS, Thomas, an American painter, born in Newtown, Bucks co., Pa., Oct. 18, 1823. He attempted portrait painting in his 15th year, and in 1838, after copying the casts in the Pennsylvania academy of fine arts, entered the life and antique schools of the national academy of design in New York, to whose annual exhibition in 1841 he contributed a picture of the “Death of Abel.” For several years he painted portraits and compositions, and in 1845 went to Europe. He passed three years in Italy, chiefly at Rome, afterward studied under Couture in Paris, where he remained about a year, and after a brief residence in England returned to New York in 1849. He has since devoted himself principally to portrait painting, but has occasionally produced landscapes and figure pieces. Among his portraits are those of Dr. Kane in the cabin of the *Advance*, Longfellow, Margaret Fuller, Henry Ward Beecher, Edwin Booth as Iago, and a large picture of the “Contemporaneous Authors of America.” In 1865 he published a eulogy on Thomas Crawford.

HIDALGO, a word applied in Spain to every noble man or woman, but strictly the title of the lowest order of nobility, constituting the *hidalgua*. Some writers derive the word from *hijo del Goto*, the son of a Goth, such descent being held in Spain to imply greater purity of blood than when intermixed; others from *hijo de alguno*, son of somebody. Hidalgos are divided into *hidalgos de naturaleza*, deriving their privileges from their ancestors, and *hidalgos de privilegio*, who have purchased their rank, or obtained it by court favor instead of descent, and are in this respect on an equality with simple *caballeros* and *escuderos*, or knights and squires. A *hidalgo de bragueta* was one supposed to possess the privileges of nobility from being the father of seven sons without an intervening daughter; and a *hidalgo de gotero* was one who enjoyed the rights of nobility in one place alone. The privileges of the hidalgos were abolished by the introduction of the constitutional system. In Portugal the word *fidalgua* embraces all the nobility under the common denomination of *fidalgos*.

HIDALGO, a S. W. county of Texas, separated from Mexico by the Rio Grande, which is navigable all along the border; area, 3,200 sq. m.; pop. in 1870, 2,387, of whom 41 were colored. About half of it is sandy and fit only for pasture; the other half is productive with irrigation, and will yield two crops a year. The principal trees are the live oak, mezquite, and ebony elm, which attain but a small size; the ash and willow grow in the valley of the Rio Grande. Stock raising is the chief industry. There is a salt lake, known as Sal del Rey, from which large quantities of

salt of superior quality are taken to northern Mexico. The chief productions in 1870 were 7,380 bushels of Indian corn and 117 bales of cotton. There were 3,459 horses, 4,496 milch cows, 13,645 other cattle, 11,270 sheep, and 555 swine. Capital, Edinburgh.

HIDALGO Y COSTILLA, Don Miguel, a Mexican revolutionist, born in South America in the latter part of the 18th century, shot at Chihuahua, Mexico, July 27, 1811. He was a priest, and in early life was noted for the conscientious fulfillment of his ecclesiastical functions. He is said to have introduced the silkworm into Mexico, and did much to promote the culture of the vine. The policy of the Spanish government being to discourage all manufactures or agriculture which could interfere with the revenue, the vines planted by Hidalgo were destroyed. This drove him to rebellion. Possessing much influence among the Indians, he formed the plan of a general insurrection, which was to take place Nov. 1, 1810; but the plot having been disclosed by one of the conspirators, some of his party were arrested, and he was obliged to precipitate his movements. In September, having been joined by three officers of the garrison of Guanajuato, he raised the standard of revolt. His eloquence had a remarkable effect on the multitude who heard him, and when after his oration he unfurled a rude copy of the picture of Our Lady of Guadalupe, the patroness of Mexico, the war assumed the character of a crusade. On Sept. 29, with an army of 20,000 men, mostly Indians, he captured Guanajuato, on which occasion the greatest outrages were committed, and \$5,000,000 plundered. He took Valladolid and several small places, and soon after was proclaimed generalissimo of the Mexican army, and advanced against Mexico; but, having been excommunicated by the archbishop, the disorders and desertions consequent upon this measure, as well as the total want of ammunition, compelled him to retreat. He was defeated at Aculco by Calleja on Nov. 7, driven soon after from Guanajuato with great slaughter, and totally routed at the bridge of Calderon, Jan. 17, 1811. Leaving the remnant of his forces at Saltillo under the command of Rayon, Hidalgo set out for the United States to obtain arms and military aid; but he was betrayed on the way into the hands of the Spaniards by one of his associates, Elizondo, March 21, carried to Chihuahua, degraded from the priesthood, and shot. After his death he was regarded as a saint by the people, and within a few years the place of his execution was shown to travellers as a holy spot.

HIDES. See LEATHER.

HIERAPOLIS (sacred city). **I.** An ancient city of Phrygia, between the rivers Lycus and Meander, celebrated for its warm springs and its cave Plutonium, from which arose a mephitic vapor which was said to be poisonous to all but the priests of Cybele. It was the seat of

a Christian church in the time of St. Paul, who mentions it in his epistle to the Colossians (iv. 13). Its ruins, with stalactites and incrustations formed by its warm springs, are found at an unoccupied place called Bambuk-Kalessi. It was the birthplace of Epictetus the philosopher. **II.** An ancient city of Syria, between Antioch and Carrhæ in Mesopotamia, called Bambyce by the early natives, one of the chief seats of the worship of Astarte or Ashtoreth, and a great emporium under the Seleucidæ.

HIERO, or **Hieron** (Gr. *Ἱέρων*). **I.** Tyrant of Syracuse, succeeded his brother Gelon about 478 B. C., died in Catana in 467. After having made peace with his brother Polyzelus and Theron of Agrigentum, with whom he had been at variance, he turned his attention to foreign conquest. In Sicily he made himself master of Naxos and Catana, whose inhabitants he transferred to Leontini, while he re-peopled those cities with colonists of Dorian origin. In Italy he prevented the destruction of Locri by threatening its enemy Anaxilas with war, and subsequently effected the expulsion of the tyrant Micythus from Rhegium. But the most glorious event of his reign was his great victory over the Etruscan fleet near Cumæ, in 474. He was a liberal patron of poets and philosophers. His triumphs at the Olympian and Pythian games are celebrated in the odes of Pindar. **II.** King of Syracuse, son of Hierocles, born about 307 B. C., died about 216. He was appointed commander after the departure of Pyrrhus in 275, and in consequence of a great victory over the Mamertines was raised to the throne by the suffrages of his fellow citizens in 270. His great object appears to have been the expulsion of the Mamertines from Sicily; and when the Romans took them under their protection, Hiero allied himself with the Carthaginians, who had just arrived in Sicily with a powerful force in 264. The combined armies of the Carthaginians and Syracusans then proceeded to lay siege to Messana; but Hiero, having been attacked and defeated by Appius Claudius, the Roman consul, was panic-struck, and retreated precipitately to Syracuse. Soon after this disaster, seeing his territory laid waste by the Romans, and many of his cities in their possession, he deemed it prudent to abandon the Carthaginian alliance, and concluded a treaty with the Romans (263), by which he secured to himself the whole S. E. and E. of Sicily as far as Tauromenium. From this period till his death, nearly half a century, Hiero remained the steady friend of the Romans, and when he visited Rome was received with the highest honors. In 241 his treaty with them was changed into a perpetual alliance, and in the beginning of the second Punic war he fitted out a fleet to coöperate with that of Sempronius, and offered to clothe and feed the Roman forces in Sicily at his own expense. After the battles of Lake Thrasy-menus and Cannæ he sent troops and liberal

supplies of corn and money to Rome, and a golden statue of Victory, which was set up in the capitol. His government was singularly wise and popular, and he built numerous magnificent temples, altars, and public works in Syracuse and Acra. Archimedes was his friend. He was succeeded by his grandson Hieronymus.

HIEROGLYPHICS, or **Hieroglyphs** (Gr. *ἱερός*, sacred, and *γλῦφειν*, to carve), picture writing, or figures representing animate beings or inanimate objects, and implying words or ideas. They have been found in all parts of the world, and seem to be employed by all peoples in certain stages of civilization. Though some highly cultured nations have failed to abandon their hieroglyphical systems of writing, yet generally hieroglyphs are gradually superseded by alphabets. Every attempt at fixing the memory of an event by indicating the objects and persons concerned in it by means of rude images belongs in a measure to the class of hieroglyphs. The rude inscriptions found on walls and monuments of the ruins of Rome, Pompeii, and other ancient cities, generally represent only the scribbling of idle persons. Examples of this are found even in the ruined temples and sepulchres of Egypt, and in the tombs at Jerusalem. They have received the name of *graffiti*. A large majority of them were doubtless written with the *stilus* or *graphium* of iron or bone. The drawings are chiefly grotesque, and the writing generally gives quotations from well known poets, or simply names of visitors, gladiators, and public men. Some are mere lists of nouns and verbs, probably scribbled by school boys; others contain good wishes, prayers, and invocations; others again libels and obscenities. In spite of their general triviality, they are of great value to palæography, philology, and history, since they exhibit the every-day life of the ancients, and elucidate many obscure passages in the classics.—**Hieroglyphics**, or picture writing proper, are indications of something that the writer desired to commemorate, while ignorant of or not wishing to use a phonetic or alphabetical graphic system. It has been attempted to trace the development of such rude images into a regular system of writing. The coarse marks employed for numbering days, sheep, or scalps were followed by attempts at conveying by similar signs such ideas as were only secondarily connected with them. This picturing of abstractions implies a much higher degree of civilization than the mere attempts at drawing the outlines of the actual objects. Another advance is indicated by the hieroglyphs which represent only parts of objects as mementoes of the whole. As soon as it has been learned to employ only a few strokes which suggest some distinctive feature of an object, either to call up the object itself or an abstract idea connected with it, the beginning of systematic writing is reached. It was generally followed by the practice of indicating ideas by picturing objects that possessed phonetically the same name. This opened the way for employing signs to represent sounds

only, at first syllabic and subsequently alphabetic. Many nations have not passed through all these stages, but continue to use hieroglyphs as a system of writing. Among these are the Chinese and Japanese, whose systems, like those of the ancient Egyptians, are given under the names of their respective countries.—The rudimentary savage paintings, scratchings,

low it shows that there were three suns under heaven, that is, that the voyage took three days. The tortoise seems to indicate their getting to land, while the representation of the chief himself on horseback shows that the expedition took place since the time when horses were introduced into Canada.—The highest development of this art is found in the Mexican picture writing, or the system of hieroglyphics in use among the semi-civilized nations of Central America and Mexico previous to the discovery of America by Columbus. Among the nations which anciently had their seat near Palenque, there existed a probably pure hieroglyphical system; while among the nations of central Mexico, in the valley of Anahuac, as also among the affiliated families of San Salvador and Nicaragua, a less perfect or mixed system prevailed, which was composed of condensed pictures, and conventional or derivative representations of things, having a hieroglyphical character and a clear phonetic value. The capacity of even this less perfect or mixed system was considerable. By means of it the Mexicans recorded their history, composed their rituals and civil and religious calendars, recorded titles to property and the judgments of courts, assessed taxes or tribute, defined genealogies, &c. When Cortes landed, full accounts of him, his men, equipments, and, so far as he indicated them by word or action, of his purposes, were thus recorded and sent to Montezuma. The ecclesiastics who followed in the train of the army used their utmost exertions to acquaint themselves with this system, and adapt it to the purpose of converting the natives. The first attempt in this direction, or perhaps the first use of pictorial representations, out of which this adaptation gradually grew, was within eight or nine years after the capture of Mexico, by Testera of Bayonne, brother of the chamberlain of Francis I. Saha-

gun, Motolinia, and Peter of Ghent, as also the Franciscans generally, adopted his example of using pictures, more or less borrowed from the Mexicans, in their teachings. In the provinces near Mexico, as soon as the Franciscans commenced this adaptation, the interpreters, and numbers of the natives employed as missionaries, lent themselves to extend its scope; and Motolinia informs us that he was literally



Fig. 1.

or carvings are very much the same everywhere. They are not easily interpreted, unless it is known what they were intended to represent. It is probable that many are mere pictorial utterances without any attempt at recording a historical fact. The natives of North America were great proficient in the art of picture writing. Their hieroglyphs have been copied and interpreted by Schoolcraft. We give in the above specimen an Indian record on a pine tree. On the right are two canoes, with a catfish in one of them, and a fabulous animal, known as the copper-tailed bear, in the other. On the left are a bear and six catfish. The sense of the picture is simply that two hunters, whose names or totems were Copper-tailed Bear and Catfish, went on a hunting expedition in their canoes, and took a bear and six catfish. Fig. 2 is a picture

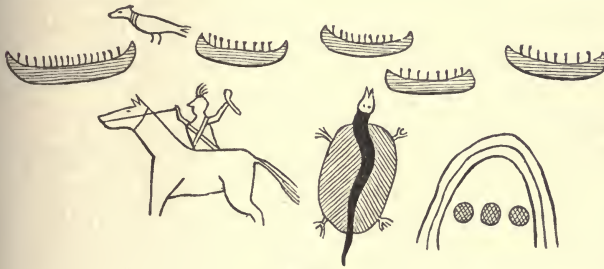


Fig. 2.

on the face of a rock on the shore of Lake Superior, and records an expedition across the lake which was led by Myeengun, or Wolf, a celebrated Indian chief. The canoes with the upright strokes represent the force of the party in men and boats, and Wolf's chief ally, Kishkemunasee, that is, Kingfisher, goes in the first canoe. The arch with three circles be-

erally overwhelmed with Indians who presented their confessions to him in figures or paintings after their mode of representation. Valdez in 1579, and Torquemada nearly a century after the conquest, received similar confessions; and it appears that this system of recording confessions was preferred to alphabetical writing, even by Indians who were versed in the

latter. Many manuscripts or paintings, having their origin with the early priests and missionaries, have been confounded with the paintings and manuscripts of true Mexican origin, and of earlier date. Many condemn all the Mexican manuscripts in existence as monkish impostures, and of a date subsequent to the Spanish conquest; but a number of paintings and manuscripts are of undoubted aboriginal origin, historical and ritual in character, dating back beyond the discovery of the continent. Some of the historical manuscripts were continued in the spirit and style of the ancient system, by competent native hands, after the conquest, and contain the Indian version of that event. There are others of equally unquestionable ancient date, but generally of a religious or mythological character, which there is reason to believe have been changed in copies, or altered in the originals, with a view to conform with priestly teachings, and illustrate the dogmas of the church. And finally there is that large class of manuscripts originating with Testera, and perfected by his followers. These seem to have been of three kinds: 1, those of Testera and the early Franciscans, which were simple paintings, more or less adapted to Indian conventionalisms in their style of execution; 2, those of a mixed kind, in which some simple paintings were preserved, largely illustrated by arbitrary native and other figures; and 3, those in phonetic characters or representations, forming a complete adaptation of the Mexican system. The third class of Christian or post-Mexican paintings are correctly described by Torquemada, who says of the mode in which the *Pater Noster* was learned: "The word in their language most nearly representing *Pater* being *pantli*, the name of a kind of small flag, they put this flag for *Pater*. In place of *noster*, a word resembling their *nochtli*, they paint a *tuna* (cactus) fig, the name of which, *nochtli*, recalls the Latin *noster*; and so they go on to the end of the prayer. By a similar process and like characters they wrote down what they wished to learn by heart. This was during the first period of their conversion, for now [between 1592 and 1614] they no longer require to use these ancient characters." The following representation of the title *Pater Noster* is copied from a manuscript in the museum of Mexico:



Pa-te noch-te, or Pa-tetl noch-tetl.

First is the figure of a little flag, or *pantli* in Nahuatl, the root of which is *pan* or *pa*; second is the sign of stone, *tetl*, root *te*, the whole making syllabically *Pa-te* for *Pater*, the *r* being wanting in the Mexican language. Next we have the sign of the fruit of the cactus, *nochtli*, root *noch*, and that of stone, *tetl*, root *te*, as before, making *noch-te* for *noster*. The whole is

therefore the nearest possible approach to the Latin, represented by Mexican figures of exact and unmistakable phonetic value. A general comparison of the ancient and positively Mexican paintings leaves no doubt that this mode of representation, by syllabic phonetics, in which the roots of words only were to be understood by the figures or sounded in reading, was the mode universally accepted, more or less mixed up with ideographic signs and simple pictures. In the historical and administrative documents of a superior order, written on skins or paper made from the maguey, the figurative writing, constantly phonetic, is no longer ideographic except in rare instances where the phonetic system fails. But paintings relating the same history do not always coincide in their signs, even when phonetically exactly alike. For instance, the name of Itzcoatli, the fourth king of Mexico, is expressed in some of the manuscripts by the figure of a serpent (*coatli*), with its back crested with knives or arrow heads of obsidian (*itzi*); the whole, *Itz-coatl*. In other paintings, however, it is written syllabically as follows: figure of an arrow head, *itzi*, root *itz*; figure of a vase, *comitl*, root *co*; figure or sign of water, *atl*; the whole, *Itz-co-atl*. The documents of this class, in which the syllabic writing predominates, are generally land registers, tribute rolls, judgments of courts, genealogies, &c., and were continued long after the conquest, and for the use of the Spanish administrations were often accompanied by literal translations from which alone a very full dictionary of the Mexican signs might be constructed. In numeration and chronology the Mexican system was exact and ample. Most of the historical paintings are simple annals, but some give more specific dates, down to the day of the month on which the event recorded took place. The most striking and to the uneducated eye the most interesting of the Mexican paintings are the ritual calendars, and schemes of judicial astrology, which make up the greater part of Lord Kingsborough's published collection. Excepting the designations of the days, these seem to be purely figurative or symbolical, intended only for the use of the priests and diviners, and possessed of an esoteric significance. They are valuable only in connection with the study of Mexican mythology and the Aztec religion and superstitions. There is a wide distinction to be drawn between those found in Mexico and those obtained in Central America. Of the latter but few examples are known to exist. The so-called Dresden manuscript, published by Lord Kingsborough, is perhaps the only perfect example of this kind in Europe. Its figures and signs coincide with those sculptured on the monuments of Palenque, Yucatan, and Copan, and identify it as the work of the same people. It has but slight resemblance to the Mexican manuscripts already discussed, and seems to mark a far higher development of the graphic art. So far as they can be made out, the elements of the Central

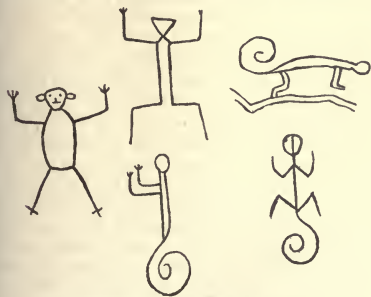
American or Toltecan system were few and very exact in their application, not admitting of that variation which would naturally result from the caprice or varying individual conceptions and tastes of those working under the system of Mexico. We discover in it no proper representations of things, except as pictures illustrative of what may be called the text of the manuscripts in which they are used, or in miniature in the text when employed as signs or characters, having a fixed and constant value, or modified only by the addition of arbitrary signs, like the points in oriental writings. It is undoubted that such manuscripts as that of Dresden were in common use in all parts of Central America occupied by the Tzendal or Toltecan stock at the time of the discovery, and that the existing aboriginal population of that country is chiefly made up of the descendants of the authors of the system then in use, who were equally the builders of the monuments to which uncritical investigators would assign a foreign origin and high antiquity. The Mexican system seems to have been intermediate between the rude picture records and mnemonic symbolism of the North American Indians, and the hieroglyphical and probably purely phonetic system of Central America, but at the same time of higher development and capacity than that of New Granada and Peru. It was evidently in an infant but progressive state at the time of the conquest.—Charles B. Brown has given in the "Journal of the Anthropological Institute of Great Britain and Ireland" (London, 1873) an account of hieroglyphical inscriptions occurring in British Guiana. On the river Essequibo they are found at the Waraputa cataract, at Cumutie rock, at the Onropocari cataract, at the Takarimi rock, and at the Bubumana cataract. They are also met with on the banks of the Quitaro, Cotinga, Ireng, Corentyn, and Berbee rivers. The Indians now living in Guiana know nothing of picture writing, and ascribe the hieroglyphical inscriptions to the handiwork of Makunaima,

du Mexique, &c. (Paris, 1864-'6); and the various archæological and ethnological periodicals.

HIERONYMUS. See JEROME.

HIEROPHANT (Gr. *ιεροφάντης*, from *ιερός*, sacred, and *φαίνω*, to make known), the presiding priest in the Eleusinian mysteries, who conducted the ceremonies of initiation. He could be chosen only from the family of the Eumolpidae, whose ancestor Eumolpus was regarded as the founder of the mysteries. His body must be without defect, his voice sweet and sonorous, and his life without reproach. If he married, he thereby renounced the sacred office. A diadem adorned his brow, his hair hung down over his shoulders, and in the mysteries he represented the creator of the world with mystical symbols. He preserved and transmitted the secret and unwritten knowledge which was the object of the institution. In the last ages of paganism the hierophants seem to have become thaumaturgi and magicians.

HIGGINSON. I. Francis, an English clergyman, born in 1587, died in Salem, Mass., Aug. 6, 1630. He was educated at Cambridge, England, and subsequently became rector of a parish in Leicester. Becoming a nonconformist, he was deprived of his benefice, and was employed among his former parishioners as a lecturer. While apprehending an interruption in these duties in the shape of a summons to appear before the high commission court, he received an invitation from the Massachusetts company to proceed to their colony. He embarked early in May, 1629, and arrived at Salem June 29, and on July 20 was chosen teacher of the congregation established there, Samuel Skelton, his companion on the voyage, being chosen pastor. Each of them consecrated the other by the laying on of hands, assisted by several of the gravest men. Subsequently Higginson drew up "a confession of faith and church covenant according to Scripture," which on Aug. 6 was assented to by 30 persons, who associated themselves as a church. On this occasion, says Palfrey, "the ministers, whose dedication to the sacred office had appeared incomplete till it was made by a church constituted by mutual covenant, were ordained to their several offices by the imposition of the hands of some of the brethren appointed by the church." Higginson continued to discharge the duties of his office until the succeeding year, when, in the general sickness which ravaged the colony, he was attacked by a hectic fever of which he ultimately died. He wrote "New England's Plantations, or a Short and True Description of the Commodities and Discommodities of the Country" (4to, London, 1630), and an account of his voyage, which is preserved in Hutchinson's collection of papers. **II. John**, an American clergyman, son of the preceding, born at Claybrooke, Leicestershire, England, Aug. 6, 1616, died in Salem, Mass., Dec. 9, 1708. He emigrated to New England with his father, adopted the profession of a preacher, and for many years was settled



Inscription on the Bubumana Rock.

their great spirit.—See Tylor, "Mexico and the Mexicans" (London, 1861) and "Researches into the Early History of Mankind" (1870); Brasseur de Bourbourg, *Monuments anciens*

over a congregation at Guilford, Conn. In 1660 he was ordained pastor of the first church in Salem, of which his father had been teacher, and where he remained until the close of his life, at which time he had been 72 years in the ministry. He was a zealous opponent of the Quakers, although he subsequently regretted the warmth of his zeal; but he took no part in the proceedings respecting the witchcraft delusion in 1692. He is the author of a number of occasional sermons and miscellanies, including the "Attestation" to Cotton Mather's *Magnalia*, prefixed to that work (1697), which has been highly praised for its eloquence.

III. Thomas Wentworth, an American author, a lineal descendant of Francis Higginson, born at Cambridge, Mass., Dec. 22, 1823. He graduated at Harvard college in 1841, and at the theological school of Cambridge in 1847, and was settled over the "First Religious Society" at Newburyport. In 1850 he was the freesoil candidate for congress, and was defeated. His anti-slavery principles being distasteful to a portion of his congregation, he resigned his pastorate in 1850, and two years later became minister of a "Free Church" at Worcester. In 1853 he headed an attack on the Boston court house for the purpose of rescuing Anthony Burns, a fugitive slave then in custody of the United States marshal. In this affair he was wounded in the face by a sabre cut; and one of the marshal's men having been killed, Higginson was indicted for murder, but the prosecution failed from a flaw in the indictment. In 1856 he went to Kansas, where he took part in the military struggle of the free-state settlers against the pro-slavery invaders from Missouri. He retired from the ministry in 1858, to devote himself to literature. Soon after the outbreak of the civil war he recruited several companies of volunteers for a Massachusetts regiment, and was commissioned as captain. In 1862 he was appointed colonel of the first regiment of South Carolina volunteers, the first slave regiment mustered into the national service. He served with them for two years, chiefly in South Carolina and Florida, making various expeditions into the interior, in one of which he captured Jacksonville, Florida. He was wounded in August, 1863, and in 1864 had to retire from the service in consequence. He took up his residence at Newport, R. I., and has since been occupied with public lecturing and literary pursuits. His first publication was a compilation, made in conjunction with Samuel Longfellow, of poetry for the seaside, entitled "*Thalatta*" (1853). He has since published the following books, most of the contents of which appeared first in the "*Atlantic Monthly*": "*Outdoor Papers*" (1863); "*Harvard Memorial Biographies*" (1866); "*Malbone, an Oldport Romance*" (1869); "*Army Life in a Black Regiment*" (1870); "*Atlantic Essays*" (1871); and "*Oldport Days*" (1873). In 1865 he published a new translation of Epictetus.

HIGHGATE, a village of Middlesex, England, adjoining Hampstead, 5 m. N. W. of St. Paul's, London; pop. in 1871, 5,339. It is renowned for its pleasant and salubrious situation on a hill, for its fine villas, and particularly for its cemetery, containing the tombs of Lord Lyndhurst and other eminent persons. Coleridge passed here the last 18 years of his life, and the place has always been a favorite resort of literary people and of wealthy London merchants. It has a number of beautifully situated female seminaries and other schools, and a fine parish church. Lady Burdett-Coutts has a magnificent mansion here.

HIGHLAND. I. A W. county of Virginia, bordering on West Virginia, bounded N. W. by the principal ridge of the Alleghany mountains, and S. E. by the Shenandoah range; area, 425 sq. m.; pop. in 1870, 4,151, of whom 348 were colored. The S. branch of the Potomac and some of the head streams of James river rise within its limits. The surface is diversified, but consists chiefly of table land, with a rich soil. It is well timbered, and affords excellent pasturage. Iron ore is found in some parts. The chief productions in 1870 were 25,133 bushels of wheat, 6,605 of rye, 26,075 of Indian corn, 11,755 of oats, 4,650 of buckwheat, 5,743 of potatoes, 17,913 lbs. of wool, 71,557 of butter, and 5,897 tons of hay. There were 1,903 horses, 2,112 milch cows, 6,942 other cattle, 7,950 sheep, and 2,782 swine. Capital, Monterey. **II.** A S. W. county of Ohio, drained by Paint, Brush, and White Oak creeks; area, 555 sq. m.; pop. in 1870, 29,133. Its surface is elevated and uneven, and its soil fertile. The Marietta and Cincinnati railroad and Hillsborough branch traverse it. The chief productions in 1870 were 415,370 bushels of wheat, 1,110,437 of Indian corn, 153,324 of oats, 50,278 of potatoes, 81,832 lbs. of wool, 517,622 of butter, and 16,970 tons of hay. There were 9,227 horses, 6,743 milch cows, 12,783 other cattle, 25,866 sheep, and 40,834 swine; 16 manufactories of carriages, 2 of clothing, 1 of iron castings, 1 of machinery, 2 of tombstones, 10 of saddlery and harness, 6 of tin, copper, and sheet-iron ware, 4 of woollen goods, 12 flour mills, 3 tanneries, 3 currying establishments, 2 distilleries, 1 planing mill, and 9 saw mills. Capital, Hillsborough.

HIGHLANDS, a name applied to the N. and N. W. districts of Scotland, in contradistinction to the S. and S. E. parts, which are called the lowlands. Their exact boundaries are unsettled. The Grampian hills are sometimes taken as the dividing line between the two great natural divisions; but, regarded as the country of the highland clans, the highlands include all the Scottish territory W. and N. W. of an imaginary line drawn from the mouth of the Nairn in the Moray frith nearly S. E. to a point on the N. Esk, near lon. 3° W., on the S. slope of the Grampians, and thence S. W. to Culross on the estuary of the Clyde. They thus comprehend more than half of Scot-

land, including the whole of the counties of Caithness, Sutherland, Ross, Cromarty; Inverness, and Argyle, parts of Nairn, Elgin, Banff, Aberdeen, Forfar, Perth, Stirling, and Dumbarton, and the Hebrides. They are remarkable for their wild and beautiful scenery and the peculiar character of their inhabitants. The mountainous tracts S. and E. of the Clyde are sometimes called the southern highlands. (See SCOTLAND.)—For the highlands of the Hudson, see HUDSON RIVER.

HIGHMORE, Joseph, an English anatomist, born at Fordingbridge, Hampshire, in 1613, died in 1685. He resided at Sherborne in Dorsetshire, where he became eminent in the practice of his profession. His name is connected with the triangular cavity in the upper maxillary bone, lined with mucous membrane and communicating by a small opening with the middle passage of the nares, termed the *antrum Highmorianum*. He published in 1651 *Corporis Humani Disquisitio Anatomica*.

HIGHWAY, a place over which the public have a right of passage. It may be a footpath, a bridle path, a cart way, or a road wide enough for vehicles of any kind to pass each other; and for many purposes there may be a highway over water, whether it be a running stream or a lake. The origin of the word is not certainly known; but a simple derivation refers it to the time when all public roads were raised above the surrounding fields, by the addition of materials, for the purpose of securing a dry road bed. In English law it is usually called the king's highway, because by the theory of that law it was considered as having been originally given by him. In the United States a highway may exist by prescription, or by the dedication of the land to the public use by the owner, which may be expressed or implied from long and uninterrupted use by the public. But as highways are to be kept in repair by the public, no person can make a highway over his land by merely opening and surrendering it for that purpose, unless it be formally accepted by those having authority to do so; although this also may be implied from usage and lapse of time. With us, nearly all highways are now laid out by the proper officers; and, when laid out, they are generally either county roads or town roads. The public have, by the right of eminent domain, full power to take land for this purpose upon making compensation to the owner. But the public can take only what it needs; and as it needs for the purpose of a highway only the right of passage, or, as it is called in law, the right of way (which is what the law calls an easement), it leaves the absolute property in the land to the original owner; and should the highway be discontinued, the land would remain in the hands of the owner, free from the easement. Presumptively the abutters upon a road, by which is meant those who own to it, own to the middle of it, subject to the public right of way. This ownership does

not exist if the grant or conveyance to the abuttor expressly and distinctly limited him to the edge of the road; but merely bounding a piece of land by the road has not this effect, for by the road there is meant the middle or thread of the road. A highway may be discontinued and the easement lost, either by the express action of competent authority, or by a complete nonuser for a sufficient length of time. The obligation of the public to keep highways in repair is not so far absolute as to give individuals injured by the neglect an action for damages unless so declared by statute; but in many of the states such actions are given, either against the town or county; and in most of the states municipal corporations existing under special charters are held liable to such actions on their implied undertaking with the state to keep their streets in safe condition.

HILARION, a saint of the church, born, according to St. Jerome, near Gaza about 291, died in the island of Cyprus in 371. He was the son of pagan parents, and was sent by them to Alexandria to be educated, where at the age of 15 he became a Christian. Returning to Palestine after the death of his parents, he embraced monasticism, gave away his property, and entered upon a life of austerity. He attracted to his retreat in the Syrian desert crowds of visitors. After the death of St. Anthony, he made with some of his monastic brethren a pilgrimage to the cell and tomb of the saint in Egypt. To escape as well the importunities of friends as the persecution of foes, he sailed for Cyprus, where he was soon discovered and joined by his disciple Hesychius. Hence he passed to the Dalmatian coast, and finally settled in Cyprus. A vast number of miracles are ascribed to him. His festival, which is kept on Oct. 21, was celebrated as early as the 5th century.

HILARY, a pope of Rome, successor of St. Leo I., born in Sardinia, died in 468. From the beginning of his priesthood he had been noted for his zeal for the faith and his hostility to heresy. At the "robber council" of Ephesus, in 449, he appeared as the representative of Leo, sustaining the doctrine of the church against the theory of Eutyches. He was chosen to the Roman see in 461. He improved the discipline of the church, confirmed the anathema against Nestorius and Eutyches, prohibited the long established practice of bishops nominating their successors, forbade men who had been twice married or who had married widows to receive holy orders, held at Rome in 465 a council for reforms, and solemnly ratified the former ecumenical councils.

HILARY (HILARIUS), a saint of the church, born in Poitiers about the year 300, died there in 367 or early in 368. His parents, who were pagans of patrician rank and very wealthy, gave him a careful education. He was of ripe age, distinguished for learning and eloquence, when, with his wife and daughter, he embraced

the Christian faith. About 353 he was chosen bishop of his native city, and set himself zealously to combat the Arian heresy, which was then the religion of the emperor Constantius II., and predominant in Italy, Spain, and Africa, and which the protection of the emperor and his officers and their persecution of the orthodox were making popular among the people and clergy of Gaul. In 355 Hilary wrote to the emperor, remonstrating with him on this persecuting spirit. In 356 he was induced to present himself to the council of Béziers, almost entirely composed of Arian bishops, when he attacked Saturninus of Arles, the apostle of Arianism in Gaul, but was condemned by the majority, denounced to the emperor as a disturber of the peace of the church, and banished to Phrygia, together with his friend Rodaninus, bishop of Toulouse. From his exile he wrote frequently to his flock and his brother bishops in Gaul to stir up their faith, fortitude, and zeal. He composed at the same time his work on "Synods," which was written in a conciliatory spirit, and his 12 books on "The Trinity," which became the standard of orthodoxy in the western churches. In 359, at the instance of the emperor and the Asiatic bishops, he assisted at the council of Seleucia in Isauria, and triumphantly defended the divinity of Christ. From thence he went to Constantinople, where he boldly arraigned the emperor and his Arian counsellors, who deemed it advisable to send him back to Gaul. Before leaving the capital he wrote his vehement "Invective against Constantius." He assembled several councils after his return to Poitiers, and obtained the deposition of Saturninus, and a formal retraction from nearly all the bishops who had subscribed to the creed of Ariminum. He then passed over into Italy to oppose as well the untimely severity of the orthodox Lucifer as the proselytizing and persecuting zeal of Auxentius, the favorite of the new emperor Valentinian; but he was forced by an imperial order to return to his diocese, where he soon after died. St. Jerome calls Hilary "the Rhône of Latin eloquence" (*Latina eloquentia Rhodanus*). The best editions of his works are that published by the Benedictine Constant (fol., Paris, 1693; republished by Maffei with several additions, Verona, 1730), and that of Oberthier (4 vols. 8vo, Würzburg, 1781-'8).—See Reinkens's monograph, *Hilarius von Poitiers* (Schaffhausen, 1864; Breslau, 1865).

HILDA, Saint, abbess of Streaneshalch (now Whitby) in Yorkshire, born in 617, died in 680. She was a grandniece of Edwin, king of Northumbria, was devoted to a religious life from her 13th year, and founded in the reign of Oswald a small nunnery on the Wear. In 650 she became abbess of Hartlepool, where in 655 she was intrusted by Oswy with the education of his daughter Elfleda. The royal munificence enabled her to erect soon afterward a monastery at Whitby, which her reputation

for sanctity soon made the most flourishing in England. It became the home of many eminent men, among whom may be mentioned Hedda, Wilfrid, and Cædmon, the poet. Hilda's feast is celebrated on Nov. 18. She is praised by historians for her successful efforts in converting the pagans.

HILDBURGAUSEN. **I.** A former duchy of Germany, since 1826 united with Meiningen. (See SAXE-MEININGEN-HILDBURGAUSEN.) **II.** A town, capital of the duchy, on the Werra, 20 m. S. E. of Meiningen; pop. in 1871, 5,148. It has a ducal castle, a gymnasium, an insane asylum, a normal school, and a deaf and dumb institution. The bibliographical institute of J. Meyer, which in 1828 was transferred hither from Gotha, is among the most prominent publishing houses of Germany. From 1695 to 1826 the town was the residence of the duke of Saxe-Hildburghausen.

HILDEBRAND. See GREGORY VII.

HILDEBRANDT. **I.** Ferdinand Theodor, a German painter, born in Stettin, July 2, 1804. He studied under Wilhelm Schadow at Berlin, with whom in 1826 he went to Düsseldorf, and in 1830 to Italy, finally taking up his residence at Düsseldorf, where he became professor. His works include examples in historical, religious, and genre art. Scenes from poetry, especially from Shakespeare, are his favorite subjects. Among his pictures are: "Faust" (1825), "Cordelia and King Lear," for which Devrient sat as a model (1826), "Romeo and Juliet" (1827), "Clorinda" (1828), "The Robbers" (1829), "Judith and Holofernes" (1830), "The Soldier and his Child" (1832), "The Children of King Edward" (1835), "Othello before the Doge of Venice" (1848), "Juliet taking the Draught" (1853), and "Cordelia reading the Letter to Kent" (1859). Among his later works are illustrations of Uhland and designs from German ballads. He has also painted many portraits, those of old men being especially admired. He has been styled the first colorist of the Düsseldorf school. **II.** Eduard, a German landscape and genre painter, born in Dantzig, Sept. 9, 1817, died in Berlin, Oct. 25, 1868. He was a pupil of Isabey, and in 1843 gained the first prize at the Paris exhibition. He then took up his residence in Berlin, and became professor in the academy of art. Among his numerous pictures, of which aerial effects are the predominant characteristic, are scenes in North and South America, the Pyrenees, the Canaries, Madeira, the Orient, the Alpine regions, and the extreme north of Europe. He illustrated a hall in the Sans Souci palace with scenes from the Holy Land.

HILDEGARD, or Hildegardis, Saint, born in 1098 at Böckelheim, in the diocese of Mentz, died at Rupertsberg, near Bingen, in 1180. Her father, who held the rank of count, intrusted her in her 8th year to the abbess of the Benedictine convent of Disibodenberg, of which she afterward became abbess herself. While there she had her first ecstatic visions, of which she

drew up a relation. Her fame so increased the number of her nuns, that she built a new convent on the Rupertsberg, on the Rhine. She now wrote several books both in German and in Latin, and published a full account of her revelations in a work called *Scivias*. She corresponded with all the crowned heads, princes, and prelates of her time, and travelled through the cities of Germany, discoursing publicly on divine things. Her visions or revelations were considered by many as illusions. They were examined by the council of Treves in 1147, and their publication was authorized by Pope Eugenius III. Hildegard has never been solemnly canonized. Her feast is celebrated on Sept. 17. A complete edition of her writings was published in Cologne in 1566. Among the most important are: *Scivias, seu Revelationum Libri III* (fol., Cologne, 1698); *Sanctæ Hildegardis Epistolæ*, in Martène's collection (Rouen, 1700); *Hortus Sanitatis*, a medical dictionary, which, printed with the *Etymologicon* of Isidore of Seville, forms an encyclopædia of the middle ages; and *Libri quatuor Elementorum* (Strasbourg, 1533).—See Meiners, *De Sanctæ Hildegardis Vita, Scriptis et Meritis* (Göttingen, 1793); Dahl, *Die heilige Hildegard* (Mentz, 1832); and Reuss, *De Libris Physicis Sanctæ Hildegardis* (Würzburg, 1835).

HILDESHEIM, a town of Prussia, in the province and 18 m. S. E. of the city of Hanover; pop. in 1871, 20,532, including about 6,500 Roman Catholics and 400 Jews. The construction of the town is irregular, but the crooked streets are exceedingly quaint, and vestiges of remote antiquity abound in every direction, especially in the churches, many of which are Roman Catholic, owing to the mediæval celebrity of the place as the capital of a great episcopal see; and it continues to be the seat of a Roman Catholic bishop. The cathedral contains a treasury rich in antique church plate, and many famous relics and works of art. Other renowned Catholic edifices are those of St. Godehard and St. Michael, and St. Andrew's Lutheran church is remarkable for its lofty towers. Hildesheim abounds in hospitals and charitable institutions, and among the numerous schools are seminaries for Roman Catholics and Protestants. The trade consists chiefly in agricultural and horticultural products, and leather, sail cloth, tobacco, and carriages are manufactured. In 1868 many Roman antiquities were discovered here, including a number of silver vessels, supposed to belong to the camp equipment of Varus.—Charlemagne founded the see of Elze, which was transferred by Louis le Débonnaire to Hildesheim shortly after his father's death. In the 10th and 11th centuries, under the bishoprics of St. Bernard and St. Godehard, it reached an importance which, despite occasional conflicts, went on increasing till early in the 16th century, when a bitter struggle, known in history as the *Hildesheimer Stiftsfehde*, resulted in the annexation of a great part of the terri-

tory to the Brunswick dominions. Many of these possessions were restored to the see in 1643, and full religious liberty was secured in 1711 for the Protestant population, who had long been subjected to persecutions on the part of the Catholic authorities. The see was allotted to Prussia in consequence of the peace of Lunéville (1801). In 1807 it became part of the French kingdom of Westphalia, after the fall of which it was a Hanoverian principality till 1866, when it became part of Prussia.

HILDRETH, Richard, an American author, born in Deerfield, Mass., June 28, 1807, died in Florence, Italy, July 11, 1865. He graduated at Harvard college in 1826, and while studying law in Newburyport furnished contributions to the "Boston Magazine" and the "New England Magazine." He entered upon the practice of law in Boston, but abandoned it in July, 1832, to become the editor of the "Boston Atlas." In the autumn of 1834 he went for the benefit of his health to the south, where he resided about a year and a half on a plantation. While here his anti-slavery novel, "Archy Moore" (1837), was written. It was republished in England, and in 1852 an enlarged American edition appeared under the title of "The White Slave." In 1836 he translated from the French of Dumont Bentham's "Theory of Legislation" (2 vols. 16mo, Boston, 1840). His next publication was a "History of Banks," an argument for the system of free banking with security to bill-holders, subsequently adopted in New York and several other states. In 1837 he wrote for the "Atlas" a series of articles against the annexation of Texas, which did much to stimulate the obstinate resistance it encountered in the free states. After passing the winter of 1837-'8 in Washington as correspondent of the "Atlas," he resumed his editorial post as an advocate of Gen. Harrison, of whom he wrote a biography. In 1840 he published, under the title of "Despotism in America," a volume on the political, economical, and social aspects of slavery, to which in the edition of 1854 was appended a chapter on the "Legal Basis of Slavery." His controversial pamphlets, including a letter to Prof. Andrews Norton of Cambridge on "Miracles," were contributions to a long and exciting theological discussion in Massachusetts. A residence of three years, commencing with 1840, in Demerara, British Guiana, stimulated his anti-slavery activity; and, as the editor successively of two newspapers in Georgetown, the capital of the colony, he earnestly advocated the system of free labor. His "Theory of Morals" (Boston, 1844), and his "Theory of Politics" (New York, 1853), written during his sojourn in Guiana, were attempts to apply rigorously to ethical and political science the same inductive method of inquiry which has proved so successful in other sciences. His principal work is his "History of the United States" (6 vols. 8vo, New York, 1849-'56). This undertaking he had project-

ed during his life in college, and he gave to it many years of thorough deliberation and study. The period covered extends from the settlement of America to the end of Monroe's first presidential term. He also published a historical work on "Japan as it Was and Is" (12mo, 1855). For several years Mr. Hildreth was engaged on the staff of the "New York Tribune," contributing also several articles to this Cyclopædia; and in 1861 he was appointed United States consul at Trieste.

HILL, a N. E. county of Texas, bounded W. by the Brazos river, and drained by small tributaries of that stream; area, 950 sq. m.; pop. in 1870, 7,453, of whom 806 were colored. The W. part is heavily timbered, and the E. part consists of prairie; the soil is rich and the climate healthy. The chief productions in 1870 were 295,668 bushels of Indian corn, 76,818 lbs. of butter, and 3,407 bales of cotton. There were 7,632 horses, 5,816 milch cows, 1,008 working oxen, 26,863 other cattle, 3,045 sheep, and 10,619 swine. Capital, Hillsborough.

HILL, **Ambrose Powell**, an American soldier, born in Culpeper co., Va., about 1825, killed near Petersburg, April 2, 1865. He graduated at West Point in 1847, served in the war with Mexico, and afterward in Florida, and was in the office of the coast survey from 1855 to 1860. He resigned his commission of lieutenant, March 1, 1861, and entered the confederate service. He took an active part in all the campaigns in northern Virginia, being present as colonel at the battle of Bull Run; at Williamsburg, where he was made a major general; during the seven days' fighting on the peninsula; at Cedar Mountain, Groveton, and Antietam; at Fredericksburg and Chancellorsville, where he succeeded to the command of Jackson's corps, but was soon disabled by a wound; at Gettysburg and the Wilderness; and finally in the siege of Petersburg. He was killed by a rifle shot at the end of the siege.

HILL, **Daniel Harvey**, an American soldier, born in South Carolina about 1822. He graduated at West Point in 1842, served in the war with Mexico, and was successively brevetted as captain and major for gallant and meritorious conduct at Contreras, Churubusco, and Chapultepec, and received a sword of honor from his native state. He resigned his commission in 1849, and became successively professor in Washington college, Va. (1849-'54), and in Davidson College, N. C. (1854-'59), and superintendent of the North Carolina military institute (1859-'61). During this period he published a work on algebra, a volume on the "Sermon on the Mount," and another on the "Crucifixion of Christ," besides several essays in southern periodicals. On the breaking out of the civil war he entered the confederate service. He commanded in the skirmish at Big Bethel, took part in the defence of Yorktown, and led a division in the battles of Mechanicsville, Cold Harbor, and Malvern Hill. When Lee made his first advance to the north,

Gen. Hill was left in command on the James. He joined Lee just after the second battle of Bull Run, took a prominent part in the battles of South Mountain, Antietam, and Fredericksburg, and was then placed for a time in command in North and South Carolina. After the war he took up his residence at Charlotte, N. C., where he has published a periodical, "The Field and the Farm."

HILL, **Isaac**, an American politician, born in Ashburnham, Mass., April 6, 1788, died in Washington, D. C., March 22, 1851. In 1809 he settled at Concord, N. H., where he established the "New Hampshire Patriot," of which he was editor for many years. He served in the senate and lower house of that state, and in 1830 was elected to the United States senate, where he remained five years. In 1836 he was elected by the democrats governor of New Hampshire, and continued in office by reelection three terms. For ten years he published the "Farmer's Monthly Visitor."

HILL, **Rowland**, an English clergyman, born at Hawkestone, near Shrewsbury, Aug. 12, 1744, died April 11, 1833. He was educated at Eton and Cambridge. He early showed a predilection for the Methodists, and while at Cambridge used to preach in the prisons and private houses. The influence of his family, however, prevented him from joining them, and he took orders in the church of England. Whitefield's reputation was then at its height, and during his absence from his chapel Hill frequently filled his place. When Whitefield died, the Methodists looked to Hill as his successor, but he declined their offers. For 12 years he preached in Wiltshire, Somersetshire, and Gloucestershire. In 1782 he laid the first stone of Surrey chapel, Blackfriars road, London, and for 50 years he was the chief preacher there in the winter, spending the summers in provincial excursions, travelling over most of England and Wales, and visiting Scotland and Ireland. He always preached without notes, and his sermons were in a colloquial, familiar strain, abounding in anecdotes, and sometimes even in jokes and puns. His most celebrated work is his "Village Dialogues," first published in 1801; the 34th edition, with additions and corrections, was published in 1824 (new ed., 1854). His memoirs were written by the Rev. Edward Sydney (London, 1844), and by the Rev. W. Jones (1845).

HILL, **Rowland**, viscount, a British general, nephew of the preceding, born in Prees, Shropshire, Aug. 11, 1772, died at Hardwicke Grange, near Shrewsbury, Dec. 10, 1842. He entered the army at the age of 18, served at the siege of Toulon as aide-de-camp to three successive generals, in Egypt in command of the 90th regiment, and in the expedition to the Weser, and in 1808 arrived in Spain with the rank of major general. He participated in the memorable advance and retreat of Sir John Moore, and rendered important services in covering the embarkation of the British army at

Corunna (1809). In the subsequent campaigns in the peninsula he distinguished himself particularly at Talavera, Arroyo de Molinos, and Almaraz. His services were rewarded by the thanks of parliament, and his elevation to the peerage in 1814 as Baron Hill of Almaraz and of Hawkestone. He closed a brilliant military career at Waterloo, where he commanded a division of the allied army. In 1828 he was appointed commander-in-chief of the British army, a post he occupied till 1842, when, upon resigning office, he was created a viscount. He possessed almost every quality of a great commander, and was called the "right arm of Wellington," who bore frequent testimony to his strategic skill and high military capacity. His personal qualities rendered him perhaps the most popular soldier of his time in the British service.

HILL, Sir Rowland, author of the cheap postage system in Great Britain, born in Kidderminster, Dec. 3, 1795. He early showed a great fondness for figures, which was subsequently developed in the study of mathematics. His first occupation was that of mathematical tutor in a school kept by his father, and for a number of years he devoted himself to improving school instruction and organization. In 1833 he was appointed secretary to the South Australian commission, and aided in founding the colony of South Australia. About this time the defects in postal arrangements began to occupy his attention, and in 1837 he published a pamphlet on post-office reform. By his personal exertions he succeeded in 1838 in having the matter referred to a special committee of the house of commons. In August, 1838, the committee reported in favor of a uniform low rate of postage as recommended by Mr. Hill, and at the next session more than 2,000 petitions were presented in its favor. In July, 1839, a bill to enable the treasury to carry Mr. Hill's plan into effect, introduced by the chancellor of the exchequer, passed by a majority of 102; and on Aug. 17 the project became a law. A temporary office under the treasury was at the same time created to enable Mr. Hill to inaugurate his plan, and on Jan. 10, 1840, the uniform penny rate came into operation. The post-office authorities were, however, hostile to the change, and Mr. Hill found himself without adequate support from the existing ministry or from that which succeeded it. His scheme worked well; during the commercial depression which followed its adoption, the post-office revenue went on increasing, while every other source of national income proved less productive than before. He was nevertheless dismissed from his office soon after the accession of the Peel ministry. In 1843 he was appointed one of the directors of the Brighton railway, in which capacity he projected several useful improvements. A subscription for a testimonial to him, begun in 1844, reached the amount of £13,000. Upon the return of the whigs to power in 1846 he

was appointed secretary to the postmaster general, holding divided authority with Col. Maiberly; and eight years later, on the transfer of the latter to the audit office (April, 1854), he became sole secretary. In 1860 he was knighted in acknowledgment of his services at the post office, and received a parliamentary grant of £20,000, the first Albert gold medal of the society of arts, and the degree of D.C.L. from Oxford. In 1865 he was appointed a member of a royal commission on railways.

HILL, Thomas, an American clergyman, born in New Brunswick, N. J., Jan. 7, 1818. He was left an orphan at 10 years of age, and at 12 was apprenticed to the printer of a newspaper, where he remained four years. He then entered an apothecary's shop, after a year's attendance at school, and served in it 3½ years. He graduated at Harvard college in 1843, completed his term of residence at the divinity school in 1845, and was settled at Waltham, Mass., on Christmas of the same year. He has published an "Elementary Treatise on Arithmetic," "Geometry and Faith," and "First Lessons in Geometry." It is, however, in his investigations in curves that he has displayed the greatest originality and fertility. He has added to the number of known curves, and simplified their expression; and by overstepping the common methods of using coordinates, and introducing new combinations, he has vastly extended the field of research. In 1859 he became president of Antioch college, at Yellow Springs, Ohio, and in 1862 of Harvard university. He resigned the latter office in 1868, resided for some years at Waltham, and is now (1874) pastor of a Unitarian church at Portland, Maine.

HILLARD, George Stillman, an American author, born in Machias, Me., Sept. 22, 1808. He graduated at Harvard college in 1828, and for some time was a teacher in the Round Hill school at Northampton. He then studied law, and was admitted to the bar in Boston in 1833. In 1846 he visited Europe, and on returning in 1847 he delivered a course of 12 lectures on Italy before the Lowell institute. He was one of the editors of the "Christian Register" (Unitarian) in 1833, and afterward of the "Jurist," and then of the daily "Courier." He contributed a life of Capt. John Smith to Sparks's "American Biography," edited Spenser's poetical works, translated Guizot's "Character and Influence of Washington" (1840), and edited the Boston "Memorial of Daniel Webster" (1853), and selections from the writings of Walter Savage Landor (1856). He has also published "Six Months in Italy" (2 vols., 1853), "Life and Campaigns of George B. McClellan" (1864), "Political Duties of the Educated Classes," "Dangers and Duties of the Mercantile Profession," and a series of school readers. He was United States district attorney for Massachusetts in 1867-70.

HILLEH, or **Hillah**, a town of Asiatic Turkey, in the vilayet of Bagdad, on both sides of the

Euphrates, and amid the ruins of Babylon; pop. about 7,000. It is a quiet, peaceable place, with well supplied bazaars, but greatly decayed from its importance under the Sassanide shahs and the caliphs, when it was also remarkable for one of the most flourishing communities of the Babylonian Jews. It is supposed by some writers to have been the place where the Hebrew captives carried off from Jerusalem by Nebuchadnezzar were chiefly established.

HILLEL, a rabbi and president (*nasi*) of the sanhedrim of Jerusalem, who flourished in the latter half of the 1st century B. C. He is distinguished from other rabbis of the same name by the surname of Hazzaken (the Elder). He is also called the Babylonian from his native country. Admired for his humanity, mildness, and love of peace, he is also celebrated as the reformer and great propagator of the study of the traditional law, the results of which were afterward collected under the title of *Mishnah* by one of his descendants and successors in the presidency of the sanhedrim, Rabbi Judah the Holy. Hillel's school flourished especially during the reign of Herod the Great, the rival school being that of the austere Shammai. Besides the legal decisions of Hillel, various sayings of his are preserved in the *Mishnah*, as well as numerous anecdotes in the *Gemara*, all of which express his love of men as well as of study. It is he who, being applied to by a pagan for instruction in the Mosaic law, replied: "'Do not to others what you do not like others to do to you,' is the essence; everything else is but comment."—Another Hillel, who flourished about the middle of the 4th century, was the author of the existing Jewish calendar.

HILLER, Ferdinand, a German composer, born in Frankfort, Oct. 24, 1811. His father, a wealthy Jew, fostered his disposition for music, and he received lessons in succession from Hoffmann, Schmidt, Vollweiler, and Hummel. At the age of 10 he was first heard as a pianist, and at 17 published his first composition, a quartet for piano and strings. He next spent seven years in Paris, devoting himself to the study of classical music, where he was heard with Liszt, Kalkbrenner, and later with Baillot the violinist, acquiring much reputation as a virtuoso. In 1836, returning to Frankfort, he was made director of the *Cäcilienverein*. During the succeeding 15 years he lived successively in Milan, Leipsic, Dresden, Düsseldorf, Cologne, Paris, and London. Finally in 1852 he settled at Cologne, where he has since remained. At Milan he brought out his opera *Romilde*; at Leipsic, in 1839, his oratorio *Die Zerstörung Jerusalems*; at Dresden his two operas *Der Traum in der Christnacht* (1844), and *Konradin, der letzte Hohenstaufe* (1847). In the winter of 1843–4 he directed the Leipsic Gewandhaus concerts. In 1847 he was made music director at Düsseldorf, in 1850 chapel-master at Cologne, and in 1851 director of the Italian opera at Paris. His compositions comprise operas, symphonies, oratorios, trios and

quartets for stringed instruments, and a large number of songs and pianoforte pieces. Among his later works is "Nala and Damayanti," a cantata brought out at the Birmingham festival in 1870. He holds honorable rank among modern German composers, and his critical writings are also esteemed.

HILLHOUSE, I. James, an American statesman, born in Montville, Conn., Oct. 21, 1754, died in New Haven, Dec. 29, 1832. He graduated at Yale college in 1773, of which institution he was treasurer from 1782 till his death. He studied law, and took an active part in the struggle of the revolution; was a member of congress in 1791, and in 1794 was chosen a member of the United States senate, where he remained for 16 years. Resigning his seat in 1810, he was appointed commissioner of the school fund of Connecticut, and continued to act as such for 15 years. **II. James Abraham**, an American poet, son of the preceding, born in New Haven, Sept. 26, 1789, died near that city, Jan. 4, 1841. He graduated at Yale college in 1808, and in 1812 delivered before the Phi Beta Kappa society a poem entitled "The Judgment, a Vision" (New York, 1812). He engaged in commerce in New York; in 1819 visited England, and published in London his drama of "Percy's Masque," which was reprinted in New York with changes in 1820; and in 1822 removed to a country seat near New Haven, where he passed the remainder of his life. In 1825 he published his second drama, "Hadad;" and in 1839 a collected edition of his writings appeared in Boston, under the title of "Dramas, Discourses, and other Pieces." It included, besides several polished prose compositions, "Demetria," a domestic Italian tragedy, which he had written in 1813.

HILLIARD, Nicholas, an English miniature painter, born in Exeter in 1547, died in 1619. He was by profession a jeweller; but having a taste for painting, he studied the works of Holbein, and became noted for his miniatures. He painted Mary, queen of Scots, Elizabeth several times, James I., and other eminent persons.

HILLIARD D'AUBERTEUIL, Michel René, a French author, born in Rennes, Jan. 31, 1751, died in Santo Domingo about 1785. He practised law in that colony, and published on his return to France *Considérations sur l'état présent de la colonie française de Saint-Domingue* (2 vols., 1776), which exposed official abuses and was suppressed by the authorities. He visited the United States during the revolutionary war, returned to Santo Domingo, and is said by some to have been assassinated, by others to have been executed. His principal works are: *Essais historiques et politiques sur les Anglo-Américains* (Brussels, 1782), and *Histoire de l'administration du lord North depuis 1770 jusqu'en 1782, et de la guerre de l'Amérique septentrionale* (London and Paris, 1784), the accompanying financial statistics being also published separately.

HILLSBOROUGH. I. A S. county of New Hampshire, bordering on Massachusetts, intersected in its E. part by the Merrimack river, and drained in the W. by the Contoocook; area, 960 sq. m.; pop. in 1870, 64,238. It has a gently diversified surface, but there are few hills of great elevation. The soil is fertile and well watered with running streams and small lakes. It is traversed by the Concord, the Contoocook River, the Peterborough and Shirley, the Monadnock, the Boston, Lowell, and Nashua, the Wilton branch, the Worcester and Nashua, the Manchester and Lawrence, and the Manchester and North Weare railroads. The chief productions in 1870 were 15,380 bushels of wheat, 163,801 of Indian corn, 74,716 of oats, 15,677 of barley, 349,692 of potatoes, 42,441 lbs. of wool, 718,696 of butter, 58,261 of cheese, and 68,089 tons of hay. There were 4,748 horses, 12,466 milch cows, 3,997 working oxen, 11,660 other cattle, 11,820 sheep, and 5,514 swine. There were 564 manufacturing establishments, with an aggregate capital of \$13,443,890, and an annual product of \$25,330,611, chiefly situated in Amherst, Manchester, and Nashua, the county towns. II. A W. county of Florida, bordering on the gulf of Mexico; area, 2,900 sq. m.; pop. in 1870, 3,216, of whom 546 were colored. Its coast is deeply indented by Tampa bay, and it is drained by Hillsborough, Alafia, and Manatee rivers. Its surface is low, level, and in some places marshy, and is timbered with live oak and palmetto. The soil is very rich. The chief productions in 1870 were 33,332 bushels of Indian corn, 27,663 of sweet potatoes, 35 hogsheds of sugar, 5,629 gallons of molasses, and 2,443 bales of cotton. There were 406 horses, 3,123 milch cows, 12,619 other cattle, and 3,679 swine. Capital, Tampa.

HILLSDALE, a S. county of Michigan, bounded S. by Ohio, and touching the N. E. extremity of Indiana; area, 555 sq. m.; pop. in 1870, 31,684. It is drained by the head waters of St. Joseph's river of Lake Michigan, St. Joseph's of the Maumee, the Kalamazoo, and Grand river. It has an undulating surface, heavily timbered in the south, and supporting elsewhere a thin growth of oak and hickory. The soil is a rich sandy loam. Iron ore and fine sandstone are found. It is intersected by the Michigan Southern, the Fort Wayne, Jackson, and Saginaw, and the Detroit, Hillsdale, and Indiana railroads. The chief productions in 1870 were 531,839 bushels of wheat, 879,032 of Indian corn, 271,732 of oats, 294,364 of potatoes, 385,051 lbs. of wool, 866,352 of butter, 35,891 of cheese, and 43,807 tons of hay. There were 8,996 horses, 10,567 milch cows, 11,303 other cattle, 89,457 sheep, and 17,492 swine; 8 manufactories of agricultural implements, 15 of carriages, 2 of cheese, 5 of furniture, 5 of iron castings, 3 of tombstones, 8 of saddlery and harness, 7 of sash, doors, and blinds, 1 of woollen goods, 8 flour mills, and 16 saw mills. Capital, Hillsdale.

HILLSDALE, a city and the capital of Hillsdale co., Michigan, at the intersection of the Lake Shore and Michigan Southern, and the Detroit, Hillsdale, and Indiana railroads, 55 m. S. of Lansing, and 85 m. W. by S. of Detroit; pop. in 1860, 2,177; in 1870, 3,518. It is surrounded by a fine agricultural region, and has an important trade in grain. It contains a chair factory, employing about 300 men, 3 flouring mills, 2 founderies and machine shops, 2 national banks, and 4 hotels. The city is the seat of Hillsdale college, an institution under the control of the Free-Will Baptists. It was originally established at Spring Arbor by a vote of the Michigan yearly meeting in 1844, and was chartered as Michigan Central college in the following year. It was removed to Hillsdale and received a new charter under its present name in 1855. The college building, a handsome brick structure four stories high, was partially destroyed by fire on March 6, 1874, and a new one is in course of erection. The grounds are spacious and well laid out. The college embraces seven departments, viz.: classical, scientific, classical preparatory, general preparatory, theological, music, art. The faculty consists of the president, 7 professors, and 14 instructors and tutors. The whole number of students in 1872-'3 was 606, of whom 391 were male and 215 female. Of this number there were 49 in the classical department, of whom 7 graduated; 175 in the scientific, of whom 20 graduated; classical preparatory, 33; general preparatory, 240; theological, 13; music, 73; art, 26. The library contains about 4,000 volumes. Hillsdale has 13 public schools, including a high school, 3 weekly newspapers, and 6 churches. It was settled in 1832, and incorporated in 1869.

HILO, a seaport town on the E. side of the island of Hawaii, in a district of the same name; pop. in 1872, 4,220, native and foreign. It is the second town in size, after Honolulu, in the Hawaiian islands. Hilo harbor, formerly called Byron's bay, has from three to eight fathoms of water; it is spacious, and protected by a reef of lava and coral from all winds except northerly ones, during which sailing vessels find it difficult to leave the port. The village and the district are among the most beautiful regions of the tropics. The climate is extraordinarily rainy. In a single year (1846-'7) there was a total rainfall of 182 in., of which 38.156 in. fell in March, 1847, and 10.466 in. in a single day. The district of Hilo is cut up by the deep channels of no less than 50 large streams, which fall into the sea within a space of coast about 25 m. in extent, discharging the rains that are poured by the trade winds upon the N. E. flanks of Mauna Kea. The freshets in these streams often come on so suddenly as to resemble the deluge produced by the sudden breaking of a mill dam. The town has four churches, viz.: Protestant and Catholic churches for the Hawaiians, a foreign church, and a seamen's Bethel.

HILTON, William, an English painter, born in Lincoln, June 3, 1786, died Dec. 30, 1839. He studied at the royal academy, and early devoted himself to historical painting, in which he displayed a complete mastery of the human figure, and singularly graceful composition. In his choice of subjects, many of which are from classic mythology, he evinced true poetic feeling. One of his best works is "Una and the Lion entering the Cave of Corceca." He was a royal academician, and succeeded Fuseli as keeper of the academy.

HIMALAYA MOUNTAINS (Sanskrit, *hima*, snow, and *alaya*, abode), a mountain chain of Asia, bordering upon India on the north, and separating it from Thibet. It is limited on the east by the Brahmapootra, and on the west by the Indus. Both these rivers, as well as the Ganges and the Sutlej, are now considered to spring from the snow fields of the Juwahir or Nanda Devi in the middle Himalaya, and those of the Kailasa in Thibet, to the north, between lon. 80° and 82° E. and lat. 30° and 31° N. The configuration of the earth is such at this point, that from the N. W. foot of the Kailasa the Indus flows N. W. along an enclosed valley, its deep-cut channel about 100 m. distant from the Himalaya to the south, until it passes through the chain about lat. 35° 40' N., lon. 74° 40' E., and from that point descends S. to the Arabian sea. On the other hand, the Brahmapootra (called at its origin the Dzang-bo-tzin or Sanpo) rises on the S. E. foot of the Kailasa, flows S. E. and E., then in lat. 27° 45' N., lon. 95° E., turns round the depressed hills on its right bank, and pursues its rapid and winding course to the bay of Bengal. Within the limits thus formed by nature the Himalaya measures in its curvings 2,000 m. in length, with a mean breadth of 180 m. The mighty ridges which rise above the plains of Thibet, and run parallel to the Himalaya from N. W. to S. E., compel both the Indus and Brahmapootra to flow from the divide of the Kailasa in a direction conformable with the enclosing mountain walls, until the increasing stream of the Indus is turned southward by the spurs sent down into its bed by the Karakorum and Hindoo Koosh, while the accumulated and rapid waters of the Brahmapootra are also turned southward and westward by the snowy masses which rise abruptly on its left bank to the east and south, where the eastern Himalaya terminates. The division of the chain into western, middle, and eastern Himalaya is founded upon like natural and obvious reasons. The western Himalaya is that portion drained by the five rivers of the Punjab, from the Indus on the west to the Sutlej on the east, their united waters being conveyed to the ocean by the former. The middle Himalaya is that portion which is drained by the Ganges, and limited on the west by the mountain masses which overlook the left bank of the Sutlej, and in which the Jumna (Jumnootri) has its manifold sources, and on the east by the course of the

Teesta in Sikkim. It comprises the territory of Nepaul. Finally, the eastern Himalaya is drained by the Brahmapootra, and is all comprised within the little-explored country of Bhootan, from the wall of stupendous peaks which runs southward above the left bank of the Teesta, to where the Brahmapootra, under the local appellation of Dihong, enters Assam. The axis of this great mountain mass follows the line of watershed, and can by a careful inspection of a good map be drawn from point to point, where the streams originate which flow from the Himalaya northward into the Indus, the Sutlej, and the Brahmapootra, and those which empty southward into these same rivers and the Ganges. The axis thus traced along the line of watershed will be found to be also the line of mean greatest elevation, although the highest peaks do not happen to be on the axis. The direction of the secondary chains is often perpendicular to the main chain, oftener oblique to it, and not unfrequently parallel, while enclosing within the in-osculating ridges valleys of great length. This fact, and the height of the summits on so many of them, and the duration of the heavy snow with which they are mantled, have led local observers to confound these snowy ridges with the axis of the chain itself. The plains of India at the E. extremity of the Himalaya are but little elevated above the level of the sea; at the foot of the mountains they may be 350 ft. above this level in the meridian of Calcutta, and in the Punjab toward the W. extremity of the range the elevation may be 1,000 ft. From these plains the view of the mountains is for the greater part of the time obscured by the vapors falling upon the southern ridges; but after the cessation of the S. E. monsoons the snowy peaks are sometimes seen at a distance of about 200 m., at an angle of elevation of only about 1° above a horizontal line. On approaching nearer to the chain, the distant peaks are lost to view behind the nearer wooded ones, and glimpses are rarely obtained that impress one with the vast magnitude and stupendous height of the chain.—Dr. Joseph D. Hooker, author of "Himalayan Journals," distinguishes four parallel longitudinal belts of country in the structure of these mountains. The lowest on the S. side extends from the plains of India to regions where snow is met with in winter. It is from 60 to 100 m. in width, ranging it may be from 5,000 to 8,000 ft. mean elevation, with peaks 13,000 to 14,000 ft. high. The lower portions are tropical, the upper temperate. It is cut up by ravines, but is not particularly precipitous. Beyond this ranges the second or snowy belt, that of the highest peaks 40 to 50 m. broad, its surface rugged and precipitous, with summits rising frequently to 20,000, some to 25,000, and a few even to 28,000 ft. above the level of the sea. Some of the rivers flow in deep gorges across this belt, their beds not more than 3,000 ft. above the sea level. The mean elevation is probably un-

der 13,000 ft. To this succeeds the central belt or axis of the chain, from 20 to 30 m. broad, its mean elevation perhaps 18,000 ft., at least in the middle Himalaya, and the main ridge or watershed seldom below 17,000 ft. except at the extremities; the surface is rocky and often precipitous. The northern belt is a region of mountains and valleys little explored, constituting the slope toward Thibet. Its climate is temperate, but of excessive vicissitudes, subject to drought, and the hills lack the luxuriant forest growth which covers those of corresponding elevations upon the other side. Skirting the southern foot of the Himalaya lies a tract of part forest, part jungle and marsh, from 10 to 20 m. in breadth. It is due to the humidity of the climate and to copious springs, as well as to the fact that this belt of pestilen-

tial waste is slightly depressed below the level of the plain to the south of it, thus allowing the collected waters to stagnate, and to produce beneath the tropical sun a rank and dense vegetation. This tract is called Terrai or Taragani, "passage through," and its outer habitable region Kadir. It gradually narrows away as it gains in height toward the central portion of the chain, and disappears W. of the Sutlej. Back of this tract Dr. Hooker says that "the mountains rise more or less suddenly, though seldom in precipices." They are reached sometimes by difficult paths that follow up the narrow and pestilential gorges of the rivers, or more commonly by the roads that ascend into the healthier atmosphere upon the summits of the secondary ridges. These ridges present to the traveller toward the axis of the chain a



Mount Everest, seen from above Darjeeling.

succession of ascents and descents; in each valley his progress is interrupted by a stream tributary to the nearest river to the right or left, or by the deep gorges of the larger branches themselves; and upon the slopes his course is impeded by forests and rocky precipices. No plain anywhere opens out before him; and during the warmer portion of the year cloud and fog shut in the view from the commanding points he reaches. So rugged are the mountains that 12 or 14 days are usually required for the journey of about 100 m. to the axis of the chain upon the main routes from India to Thibet. The difficulties thus opposed to exploration or settlement are not compensated by the presence either of great mineral wealth or of large tracts favorable to culture. On the other hand, it would be unjust to adopt the descriptions of occasional travellers. It takes a long time, even for one acquainted with

mountain regions, to trace correctly the various positions of ridges and spurs, of valleys and river courses, in any large area of an alpine aspect; but this difficulty is nowhere so formidable as among the huge masses and labyrinthine windings of the Himalaya. By most travellers the secondary ridges on the S. side, particularly of the E. portion of the chain, are represented as spurs leaving this at right angles, though as seen from the plains at a distance they present the appearance of longitudinal ridges. The strike of the rocky formations of which the chain is composed—the metamorphic slates and granitic rocks of the central portion, and the Silurian sandstone of the southern ridges—is described as everywhere with the general course of the mountains, thus suggesting a resemblance of the system to that of the Appalachians of the United States in its parallel ridges and valleys,

though this feature on the S. side of the Indian mountains may be obscured by the effect of rapid and excessive drainage.—The statements as to the relative amount and duration of the snow upon the N. and S. slopes of the chain have led to much controversy. The authorities generally concur in representing that milder temperatures prevail upon the N. side than at corresponding heights on the opposite side. The two Gerards place the line of perpetual snow on the S. side at 12,981 ft., and on the N. at 16,620. Lieut. Strachey, extending his observations over a district between lon. 77° and 81° , where heights covered with perpetual snow are found over a belt of 35 m. in width between lat. 30° and 32° , concluded that the snow line on the Thibetan side is 18,500 ft. above the sea, and on the Indian side 15,500. On the S. slope grain is cultivated with difficulty at 10,000 ft., while on the other side good crops are raised at 16,000 ft. It grows even at 18,544 ft., as seen by Capt. Gerard. This is more than 1,200 ft. higher than the snow line in the equatorial Andes. The belt constituting the watershed is described as excessively cold, bleak, and dreary, but in great part free from snow. This is no doubt owing to the rain clouds being deprived of their moisture as they are swept from the bay of Bengal over the secondary ridges, upon which it is in part precipitated in rain and the remainder in snow upon the higher peaks. But the cause of the milder temperature is not so obvious.—The highest peaks are not found along the line of highest mean elevation, but for the most part they are S. of it, rising in scattered groups from the secondary ridges. Of several of these groups E. of Sikkim little is known, except that as seen from a distance they appear to reach heights of 23,000 to 25,000 ft., or perhaps more. North of Sikkim is a noted group of immense peaks, among which stands preëminent Kintchinjunga, 28,156 ft. (Petermann), or 28,178 ft. (Hooker), in lat. $27^{\circ} 42'$, lon. $88^{\circ} 11'$; and one degree further east Chumulari, 23,946 ft. (P.), or 23,929 ft. (H.). Upon the same parallel, in lon. $85^{\circ} 58'$, stands Mt. Everest, believed to be the highest summit on the globe, having, according to the survey of Col. Andrew Waugh, an altitude of 29,002 ft. Its English appellation is derived from the name of a distinguished officer of the Indian survey. In the Nepaulese its name is Gaurisankar; by the people of Thibet it is called Chingofanmari. Mr. Hodgson had incorrectly given to it the name Deodunga or Deodhunga, which was that of a peak near by of comparatively small elevation. Dhawalagiri, in lat. $28^{\circ} 42'$, lon. $83^{\circ} 32'$, formerly estimated at 28,000 ft., is rated by Col. Waugh at 26,826. From the W. extremity of Nepal to the passage of the Indus through the chain, no fewer than 50 peaks are enumerated, the heights of which range between 19,500 and 25,749 ft., which latter is the height of Nanda Devi in Kumaon, drawn by Heber as a snowy spire,

its sides sloping at an angle of 70° with the horizon, and rising far above the similarly snow-clad summits around. Every 12th year the natives make a pilgrimage to this mountain, and the few who succeed in reaching the spot hold a religious festival at a point below the inaccessible summit. The mean height of the central portion along the western Himalaya is estimated at 20,000 ft.; and the passes sometimes cross at heights of 18,000 to 19,000 ft.—The lakes occurring in the Himalaya are few in number, and not of very great extent; the only important ones are on the N. side of the axis, and are the sources of the branches of the Indus, Sutlej, and Sanpo. Some of these are salt. The largest are from 20 to 30 m. in length. The Wullur lake in Cashmere, 5,000 ft. above the sea, is a sheet of water 21 m. long E. and W., and 9 m. broad, formed by the spreading out of the river Jhylum, the only instance on the whole range of a river thus expanding into a lake. The rivers are fed during the summer by copious rains brought up by the S. E. monsoons, which sweep over the bay of Bengal, and, reaching the eastern Himalaya in April, gradually progress westward. The whole S. side of the chain by midsummer is enveloped in clouds and mists. In September they begin to clear off in the western divisions, but in the eastern the rains are not over till October or November. In the winter an upper current of S. W. winds brings new supplies of moisture, which falls in snow upon the higher mountains, and there is in the more humid provinces a short rainy season about the close of the year. The outer ranges receive the most of the rain. Dr. Hooker estimates the fall in Sikkim to amount to 120 in. in the year at 7,000 ft. elevation, and to gradually decrease to 10 in. at 19,000 ft. The river courses to the S. are thus much larger and more numerous than those upon the N. side of the chain. In their upper portions their descent is comparatively gentle, but further down they run with great rapidity, and generally in deep and almost inaccessible ravines; yet they rarely form cascades of any grandeur. Fish of the carp kind abound in them from the plains to 15,000 ft. elevation, except at heights between 5,000 and 10,000 ft. Those of eastern Thibet especially swarm with fish at elevations from 10,000 to 14,000 ft. Glaciers are numerous in the more elevated portions of the mountains, but are wasted away before they reach the lower valleys. Deposits of boulders and extensive moraines, found in all the valleys at heights exceeding 8,000 or 9,000 ft., indicate that the glaciers formerly reached 6,000 ft. below their present limits. Volcanoes are entirely wanting throughout the range, and there are no evidences of extinct ones. Hot springs are frequently met with at heights from 10,000 to 18,000 ft., their temperature ranging from 100° to 130° F.—The geological formations through the most elevated portions of the range are

principally metamorphic slates alternating with granitic belts. They form the loftiest peaks; and against them rest strata of the Silurian period. The formations range with the chain, and are seen usually dipping toward its axis. In Kumaon rocks of the oolitic formation succeed to the Silurian, and in some of the larger river valleys, at elevations of 15,000 ft., are found tertiary beds with fossils referring them to the miocene period. Among them are specimens of extinct species of the horse, rhinoceros, elephant, hippopotamus, &c. Strata containing marine shells occur at an elevation of 16,000 ft. Fresh-water pleistocene deposits have been found by Dr. Thomson in the extreme western Himalaya of Tibet, on the flanks of mountains far above the present level of the rivers and lakes. The mineral productions are of little importance. Gold is found in eastern Tibet, but the Chinese government prevents its being worked to much extent. In Koonawur, a district at the passage of the Sutlej through the chain, are mines of specular iron ore, which have been long worked by horizontal excavations, extending sometimes half a mile into the mountains. The ore is converted into wrought iron by the natives, who make of it sabres, knives, and hatchets, the best metal being known as that of the locality called Sheel. Copper ores too are found here, and also in Nepaul and Sikkim; but they are not worked.—The vegetable productions in the lower portions of the mountains are those of the tropics. They reach up to the height of 6,000 or 7,000 ft. in the humid central portions of the range, and in the extreme western to 3,000 or 4,000 ft. In the deep gorges of the rivers are plantains, palms, and fig trees; above are magnolias and laurels; to these succeed oaks, chestnuts, birches, &c.; still higher are pine forests, then rhododendra and the scanty alpine growth. All these products of the colder portions are recognized as European forms. These indeed begin to appear as the tropical plants give way to those of temperate climes; and at heights from 6,000 to 12,000 ft. are seen species of oak, maple, ash, cherry, poplar, hornbeam, juniper, willow, pine, and many other of familiar names, some of which are identical with the species of Europe and America. The grains, garden fruits, and vegetables cultivated in the upper portions of the mountains are very similar to those of northern Europe. In the state of Bussaher, of which Koonawur is a province, grapes are extensively cultivated, and tea is produced as an article of commerce. The distribution of the fauna is similar to that of the flora: tropical forms in the lower regions, among which are found tigers, leopards, buffaloes, the rhinoceros, elephants, &c.; in the upper districts European types predominate, mixed with Chinese and Japanese forms to the eastward, and partaking in the alpine districts of the Siberian character.—The inhabitants constitute many tribes and nations, of Hindoo

or Mongolian race. Those of all the valleys above 8,000 ft. elevation are Thibetans, in whom the Aryan is more or less intermixed with the Mongolian. The English have established many stations at points situated from 6,000 to 8,000 ft. above the sea, where they find a healthy atmosphere and a climate like that of England; and they anticipate the time when the habitable portions of the Himalaya will be peopled by their own colonists and their descendants. Dr. Hooker names the following as the most important of these hill sanatoria, as he calls them: Darjeeling, elevation 7,000 to 8,000 ft., in Sikkim; Nyni Tal, 6,000 to 7,000 ft., and Almora, 5,000 to 6,000 ft., in Kumaon; Masuri, 6,000 to 7,000 ft., in Gurwhal; Kangra, 7,000 to 8,000 ft., in the Beas valley; Murree, 7,000 to 8,000 ft., between the Indus and Jhyllum; and Simla, 7,000 to 8,000 ft., in the Punjab, near the Sutlej river, a favorite resort for Europeans, being usually the residence of the governor general during a portion of the hotter months.—Among the more distinguished explorers of the Himalaya mountains are Adolf Schlagintweit, who was murdered in August, 1857, while engaged in his investigations, and his brothers Hermann and Robert. They demonstrated the correctness of Humboldt's view that there was not the least connection between the Kuenlun and Karakorum ranges and the Himalaya range, each of them being in fact an independent chain. The following are some of the many important works relating to this chain: the "Himalayan Journals" of Dr. J. D. Hooker; numerous papers in the "Asiatic Researches" and the journal of the Asiatic society of Calcutta; Humboldt's *Asie Centrale*; Bishop Heber's "Journal;" "Western Tibet," by Capt. H. Strachey; Thomson's "Western Himalaya;" *Reisen in Hochasien*, by H. Schlagintweit; and the publications of the trigonometrical survey of India.

HIMERA, an ancient Greek city of northern Sicily, at the mouth of the river Himera, between Panormus and Cephalædium. It is said to have been founded about the middle of the 7th century B. C. by a colony from Zancle (the later Messana). It was once subject to the tyrant Phalaris, and at another time was a city of refuge for the Zanclean tyrant Scythes. Subsequently, however, it came to have a despot of its own, named Terillus, who, being expelled, applied to the Carthaginians for assistance, which was the immediate occasion of the first great expedition of that people to Sicily, which took place in 480 B. C. The army of the Carthaginians, said to have been 300,000 strong, commanded by Hamilcar, was defeated at Himera with great slaughter by Gelon of Syracuse. This victory did not however restore liberty to the Himeræans, but merely transferred them from the tyranny of Terillus to that of Thrasydæus, the son of Theron of Agrigentum, under whom such numbers of the citizens were executed or ban-

ished that the city had to be re-peopled with new colonists, who, being mostly of the Dorian race, rendered it thenceforward a Doric city. After the death of his father, Thrasydæus was expelled, and then the citizens whom he had driven into exile were allowed to return. In 409 B. C. the second expedition of the Carthaginians to Sicily took place, under Hannibal, the son of Gisco and grandson of Hamilcar, to whom after a desperate resistance the city succumbed. The greater part of the inhabitants were put to the sword; 3,000 of those who had been taken prisoners were sacrificed by Hannibal to the manes of his grandfather Hamilcar, who had fallen in the great battle above mentioned, while the city itself was utterly destroyed. Himera was never rebuilt, but such of its inhabitants as survived its destruction fled to the neighboring town of Thermæ, to which they gave the name of Himera.

HIMILCO, the name of several distinguished Carthaginians, the most eminent of whom were the following: **I.** A navigator, who lived in the 6th or 5th century B. C., and who was sent on a voyage of discovery northward from Gades at the same time that Hanno was commissioned to explore and colonize the W. coast of Africa. On his return he is said to have reported that the stagnant nature of the sea, the vast mass of seaweed that floated on its surface, and the absence of wind, had prevented his progress toward the north. **II.** A general who commanded, in conjunction with Hannibal the son of Gisco, the third expedition sent by the Carthaginians to Sicily (406 B. C.). The latter having been carried off by sickness soon after their arrival, Himilco succeeded to the command. Having reduced Agrigentum and destroyed several of the Greek cities, he concluded an advantageous peace with Dionysius the Elder, tyrant of Syracuse, and returned to Africa. When Dionysius declared war against Carthage, and attacked her dominions in Sicily, Himilco was appointed to defend them. Being worsted, he retired from Sicily, but in the following spring returned with a powerful force, and after recovering the greater part of the lost territory advanced against Syracuse. This enterprise failed, and Himilco concluded an ignominious peace, returned to Carthage, and committed suicide by starvation.

HIMMEL, Friedrich Heinrich, a German composer, born at Treuenbrietzen, Prussia, Nov. 20, 1765, died in Berlin, June 8, 1814. He early attracted the notice of Frederick William II., who afforded him the means of pursuing his musical studies, and afterward appointed him royal chapelmaster. His chief opera was *Semiramide*, first performed in Naples in 1795. This work was said to contain the material of ten ordinary operas. He composed many cantatas and occasional pieces, and an immense number of pianoforte compositions and songs.

HIMYARITES, and *Himyaritic Language and Inscriptions*. Ethnologically and linguistically

considered, the term *Himyaritic* denotes the whole group of races and languages from the basin of the Euphrates, across South Arabia, to Abyssinia. The *Himyarites* are mentioned in classical literature under the name of *Hommerites*. They traced their origin to Himyar, grandson of Saba and descendant of Joktan or Kahtan, one of the mythical ancestors of the Arabs. According to their traditions, they became the dominant race in Yemen about 3,000 years before the time of Mohammed. Abulfeda, in his "Short History of the Human Race," assigns to their dynasty a duration of 2,020 years. The date of the destruction of the first Adite empire, which apparently included the whole of Arabia Felix, and not alone Yemen proper, has been fixed by Caussin de Perceval at 18 centuries B. C. It is supposed that it was caused by the invasion of the Joktanite tribes. But the Cushites, or the first Adites, soon recovered the supremacy, and for many centuries the Joktanites continued in subjection, but increased in strength, and finally usurped the dominion. During the first centuries of the second Adite empire Yemen was temporarily subjugated by the Egyptians, who called it the land of Pun. They seem to have lost it again at the close of the 18th dynasty; but Rameses II. regained it, and it was not finally lost till the time of the 20th dynasty. The Joktanites under Yarub gained the political supremacy, according to Caussin de Perceval, at the beginning of the 8th century B. C. Ibn Khaldun, a comparatively trustworthy Arab historian, says: "Lokman and his children (the new Adite empire) preserved the royalty for 1,000 years. The power of this family lasted till it was overthrown by Yarub, son of Kahtan. Conquered by him, the Adites took refuge in the mountains of Hadramaut, and finally entirely disappeared." Yashjob, Yarub's son, was a feeble prince, who allowed the chiefs of the various provinces of his states to make themselves independent; this is the origin of the separate kingdoms of Hadramaut and Mahrah, which from that time always had their own rulers, sometimes independent, and sometimes vassals of Yemen. Yashjob's son, Abd Shems, surnamed Sheba, recovered the power, and reunited under his government all the petty dynasties of Arabia Felix. Abulfeda ascribes to him the construction of the famous dike of Mareb, the rupture of which a short time after the Christian era was one of the great events of the ancient history of Yemen. The more popular tradition, however, which attributes it to Lokman and the second Adites, is considered more probable. Its ruins remain to our day. Abd Shems had several children, among them Himyar and Kahlan, from whom were descended the greater part of the Yemenite tribes at the time of the rise of Islamism. The *Himyarites* seem to have settled in the towns, while the *Kahlanites* inhabited the country and the deserts of Yemen. Himyar was only an appellation signifying

"the red," and the real name of the son of Abd Shems was Ghazahaj. The children of Himyar at first shared the royalty with other families, especially that of Kahtan. The Arab historians do not supply a complete list of the successors of Himyar or Ghazahaj. Himyar's brother Kahlan, and Wathil, Alamluk, and Shammir, are named as his successors. An Assyrian inscription speaks of Yathaamir, on whom Sargon imposed a tribute of gold, spices, horses, and camels. Esarhaddon also seems to have made an expedition to South Arabia. A large number of Arabs emigrated to Ethiopia during several centuries preceding our era. About 100 B. C. the supreme power was concentrated in the house of Himyar, and caused the ancient name of Sabeans, given to the southern Arabs, to be replaced by that of Himyarites. (See SABÆANS.) In the account of the expedition of Ælius Gallus in 24 B. C., the Himyarites appear for the first time under the name of Homerites. The most flourishing period of the Himyarites appears to have commenced with Harith er-Baish, whom Caussin de Perceval places about 100 B. C., and ended with Dhu Norvas and his successor, who were defeated by the Abyssinians in A. D. 525. South Arabia subsequently fell under the dominion of the Persians, and in 629 the Himyarites succumbed to Mohammed and accepted Islam. (See ARABIA, and YEMEN.) Direct descendants of the ancient Himyarites are the tribes of Mahrah. They are black in color, medium in stature, Semitic in countenance, strong and sinewy in structure. Their dress is a cloth for the loins and another for the head. The women are covered with a kind of shawl, and wear pantaloons and veils only in towns. A man with breeches would be an object of ridicule. They belong to the orthodox sect of the Shafei.—The so-called Himyaritic language, or, better, the language of the Sabeans, says Osiander, seems to form with Arabic and Ethiopic the southern branch of the Semitic family, and stands in a peculiar relation at once of agreement and disagreement to both in common and to each separately. In common with Arabic, it possesses the whole delicate system of sounds, the diphthongs, the laws of the transmutation of sounds, and several peculiarities of the verb. In common with Ethiopic, it has its type of a graphic system, the want of the article, and many words not found in other kindred languages. It differs from Arabic and Ethiopic by terminating the imperfect in *n*, in the form of the infinitive, and other grammatical peculiarities. Several of its characteristics it has only in common with Hebrew and Assyrian; in others it resembles the Aramaic. Several scholars therefore do not classify Himyaritic as a dialect of Arabic, but consider it an independent language, and possibly an elder sister of Hebrew and Assyrian. Renan also considers the Himyaritic too widely different from Arabic to group them together.—Karsten Nie-

buhr (1774) was the first who called attention to the existence of inscriptions in a peculiar character in the southern districts of Arabia. In 1810 Dr. Seetzen, a German traveller, followed up the indications of Niebuhr, and discovered at Zhafar three inscriptions, and five others built into the walls of the mosque of the neighboring village of Mankat. The next discoveries were made by various officers of the Palinurus, a vessel of the British Indian navy, stationed in the Red sea in order to make a survey of the coast. In 1843 Arnaud copied 56 inscriptions at Sana, Khariba, Marib, and the so-called Haram of Bilkis. Baron von Wrede discovered inscriptions on a dike in the wady Webeneh in Hadramaut, and Kennett Loftus came upon a tomb closed in with a rough sandstone slab inscribed in the Himyaritic character, while making excavations in the mounds at Warka, in southern Babylonia. The British museum has also two gems with Himyaritic characters brought from Babylonia, and two others of which the history is unknown. Coghlan and Playfair presented the museum with a number of bronze tablets, principally dedications to Almakah, discovered by them at Amran, near Sana. An altar of limestone dedicated to Athtor was found at Ibyan or Abyan, about 30 m. N. E. of Aden. Several inscriptions have been found also on the dike at Marib. Many others have recently been found, which have increased the collection to several hundred specimens. It is probable that the larger number of these monuments must be referred to the later and more flourishing period of the Himyarite kings, between 100 B. C. and A. D. 500. Two inscriptions have been discovered bearing dates, one from Sana dated 573, and one from Hish Ghorab dated 604. It does not appear however that it has been determined by what era these dates are calculated. Several Arabic writers have preserved to us alphabets of the Himyaritic character, which is called Musnad by them, with the corresponding Arabic letters. These alphabets have formed the basis of the interpretation of the inscriptions by modern orientalists. The latter are in horizontal lines, generally from right to left, but occasionally a *boustrophedon* mode is adopted, chiefly where the lines are of great length. The words are usually separated from each other by a vertical stroke, which has greatly facilitated the interpretation of the inscriptions. This was discovered from the fact that in certain formulas which frequently occur a word would sometimes terminate exactly at the end of a line, leaving no space for the upright stroke, which was then altogether omitted, showing that it was not an integral part of the writing. The inscription which we give is copied from a copper tablet sent by Prideaux from Aden. Prætorius, in the *Zeitschrift der Morgenländischen Gesellschaft* (1872), has advanced the opinion that it is a forgery like many others, as Von Maltzan has discovered that a Jewish cop-

persmith in Sana had obtained possession of copies of genuine inscriptions and made others from them by combining portions of several of them. In the case before us we have true Himyaritic characters, but the first five lines are the same as those of a copy furnished by



Himyaritic Inscription.

Halévy. They have been translated as follows: "Halaida with his sons, the sons of Madikarib, the family of Iaf 'an, has given homage to the Athtar of Qabad."—The principal notices that have appeared on the subject of the Himyaritic characters, or the interpretation of the inscriptions, are by Rödiger, Ewald, Gesenius, Gildemeister, Fresnel, Osiander, Levy, Halévy, and Prætorius. They are to be found in the *Zeitschrift für die Kunde des Morgenlandes*, the *Journal Asiatique*, and similar periodicals. The British museum published in 1863 all the inscriptions in the Himyaritic character then owned by it.

HINCKLEY, a town of Leicestershire, England, 12 m. S. W. of Leicester; pop. in 1871, 6,902. An ancient church, with a very curious oak roof, is the most interesting building. It has manufactories of hosiery, cotton thread, and worsted. Near it are Roman remains, and the neighboring village of High Cross, where two Roman roads intersect (Watling Street and the Fosse Way), is probably the site of the Roman station Benonæ or Venonæ.

HINCKS. I. Edward, an Irish archæologist, born in Cork about 1792, died at Killyleagh, county Down, Dec. 3, 1866. He studied under

his father, who was professor of Hebrew and head master of the classical school in the Belfast academical institution, graduated at Trinity college, Dublin, in 1812, took orders, and in 1826 became rector of the parish of Killyleagh. He contributed many important papers, especially on Egyptian hieroglyphics and Assyrian cuneiform inscriptions, to the transactions of various societies. Among the best known of these is a translation of portions of an inscription of Tiglath-pileser the elder, published by the royal Asiatic society (1857), in parallel columns with three other translations, in order to show by their general agreement that the true principles of interpretation had been discovered. He published a catalogue of the Egyptian manuscripts in the library of Trinity college (1849); "A Letter to Professor Renouf on the Polyphony of the Assyrio-Babylonian Cuneiform Writing" (1863); and some religious works, among which is a report of a doctrinal discussion with three Roman Catholic priests (1829). **II. Sir Francis**, a Canadian statesman, brother of the preceding, born in Cork, Ireland, in 1807. He engaged in commercial pursuits in Canada, and afterward in journalism and politics, and became proprietor and editor of the "Toronto Examiner," and a member of the legislature. He was finance minister in 1842-'3 and from 1848 to 1854, being from 1851 also prime minister. He was governor of the Windward islands from 1855 to 1862, and of British Guiana from 1862 to 1869, when he was knighted, and was again finance minister of Canada until late in 1873. He was among the first to urge a responsible ministry in Canada, and though opposed by Lord Sydenham, the governor, and by other influential persons, he secured the recognition of this principle by the English government. He has published pamphlets on political and financial subjects.

HINCMAR, a Gallican prelate, born in Aquitaine about 806, died in Epernay, Dec. 21, 882. He was brought up from childhood in the monastery of St. Denis, near Paris, where he became a monk under the reformed rule which he was himself instrumental in introducing. He was in high favor with Louis le Débonnaire, to whom he remained faithful in his adversity. In 845 he was consecrated archbishop of Rheims in place of Ebbonius, who was a partisan of the emperor Lothaire. His election was contested at Rome by Lothaire, but as Ebbonius did not urge his claim, Hincmar was confirmed. He showed much firmness in resisting the abuses of the kingly power and in restoring discipline in the church; and he was in such favor with Charles the Bald, that contemporary writers speak of him as ruling both church and state during that prince's reign. In 848 he presided over the council of Quierzy-sur-Oise, in which the Benedictine monk Godescalchus (Gottschalk) was at his instigation sentenced to be degraded from the priesthood, publicly whipped, and imprisoned for life.

This sentence, which Hincmar caused to be executed in presence of the king, excited much indignation. The most illustrious prelates of Gaul and Germany blamed its severity, and condemned both Hincmar and Rabanus Maurus, archbishop of Mentz, for falling themselves into a doctrinal error on the very matter of predestination on which they had condemned Godescalcus. A doctrinal exposition drawn up by Hincmar, and approved in 853 by a second council held at Quierzy, was censured by the archbishop of Lyons, and by the council of Valence in January, 855, Hincmar himself being present. In 852 he obtained a decree from the council of Soissons for ever excluding from preferment all persons ordained by Ebbonius. Among these was Wulfadus, elected in that year archbishop of Bourges. This decree and its execution by Hincmar were openly censured by Pope Leo IV. and annulled in 866 by Nicholas I. This pontiff also cancelled the sentence of two councils held by Hincmar at Soissons deposing Rothrad, bishop of that city, and condemning him to perpetual reclusion. In 864, however, Hincmar having refused to give episcopal consecration to an unworthy favorite of the king, the pope sustained his action. In 869 Hincmar made a vigorous opposition to Adrian II., when that pope interfered to prevent Charles the Bald from taking possession of Lorraine, after the death of the younger Lothaire. To the orders and menaces of the pope Hincmar replied by denying his right of intervention. In 871 Hincmar presided at the council of Douzy, which sentenced his nephew Hincmar, bishop of Laon, to deposition and imprisonment. No appeal to Rome was permitted; and two years afterward the prisoner's eyes were put out with a red-hot iron. Hincmar showed much courage in reproving the royal officers for their oppressive conduct, and reproached the king himself with conniving at their excesses. In 882 one of his last acts was to oppose Louis III. in his wish to have his favorite Odoacer consecrated bishop of Beauvais. On the advance of the Normans toward Rheims, Hincmar, taking with him the shrine and body of St. Remi, fled to Épernay, where he died. He did much for the welfare of the people, suppressed abuses and immorality, completed the cathedral of Rheims, founded there two famous schools, endowed their professorships, and established a public library. Sirmond published a complete edition of Hincmar's works (2 vols. fol., Paris, 1645).—See Flodoard's *Historia Ecclesiæ Rhemensis* (2 vols., Rheims, 1854, with French translation); Noorden's *Hincmar, Erzbischof von Rheims* (Bonn, 1863); and J. C. Prichard's "Life and Times of Hincmar, Archbishop of Rheims" (London, 1849).

HIND, John Russell, an English astronomer, born in Nottingham, May 12, 1823. He was educated for a tradesman, but in 1840 entered the office of a civil engineer in London. Through the influence of Prof. Wheatstone he obtained

a situation the same year in the royal observatory at Greenwich, where he remained about four years. After a short stay in Ireland, where he was sent on the commission to determine the exact longitude of Valentia, he was appointed, at the recommendation of Prof. Airy, astronomer royal, to a post in the observatory of Mr. Bishop, in Regent's park, London. He began here in 1845 a series of observations, during the course of which he calculated the orbits and declinations of more than 70 planets and comets, noted 16 new movable stars and 3 nebulae, and discovered 10 new asteroids. In July, 1846, he discovered a comet, which had been observed by De Vico two hours before at Rome; and early in 1847 another comet, which at its perihelion passage, March 24, was bright enough to be seen in the strong morning twilight. In April, 1848, he made a very remarkable discovery of a new reddish yellow variable star of the 5th magnitude in Ophiuchus. In 1850 this star was only of the 11th magnitude, and it was calculated that it would soon disappear altogether. The asteroids discovered by Mr. Hind are as follows: Iris, Aug. 13, 1847; Flora, Oct. 18, 1847; Victoria, Sept. 13, 1850; Irene, May 19, 1851; Melpomene, June 24, 1852; Fortuna, Aug. 22, 1852; Calliope, Nov. 16, 1852; Thalia, Dec. 15, 1852; Enterpe, Nov. 8, 1853; Urania, July 22, 1854. In December, 1844, he was elected a member of the astronomical society of London, and was afterward appointed its foreign secretary. He has received many other honors at home and abroad, and since 1852 has had a pension of £200 from the government. He is the director of the "Nautical Almanac" of England. His writings have generally been published in the "Transactions" of the royal astronomical society of London, in the *Astronomische Nachrichten* of Altona, and in the *Comptes Rendus* of the academy of sciences of Paris. He is also the author of "An Astronomical Vocabulary" (1852); "The Comets" (1852); "The Solar System, a Descriptive Treatise upon the Sun, Moon, and Planets, including an Account of all the Recent Discoveries" (1852); "Illustrated London Astronomy, for the Use of Schools and Students" (1853); "Elements of Algebra" (1855); and "Descriptive Treatise on Comets" (1859).

HINDOO KOOSH (Pers. *Hindu Kuh*, Indian mountain), a range of mountains in central Asia, which was known to the ancients as the Indian Caucasus. Although the name more strictly belongs to the lofty snow-clad summit, upward of 20,000 ft. in height, which rises directly N. of the Cabool valley, it is applied to the entire mountain tract extending from the southern portion of the elevated table land of Pamir, in about lat. 37° N., lon. 73° E., to the region near lon. 68° immediately W. of the city of Cabool. It separates the Punjab and Afghanistan on the south from Badakhshan and Koon-dooz on the north. The least elevation of the

range relative to the surrounding country appears to be on the plateau which forms its eastern extremity, where it is approached by the Karakorum mountains. The absolute height of the eastern portion of the Hindoo Koosh, however, is very great, the Nuksan pass, between Chitral on the south and Wakhan on the north, being estimated to be 17,000 ft. above the level of the sea. There are glaciers in this region. The range decreases in elevation as it stretches westward. Those peaks whose heights have been determined are upward of 20,000 ft. in altitude. The section which has been most thoroughly explored lies between the 70th and 68th meridians, from the Khawak pass on the east to the Hadjiyak passes on the west. It is described as an unpierced watershed, closely corresponding to the line of highest peaks, and crossed by 19 passes, none less than 12,000 ft. high. The Khawak pass, 13,500 ft., is supposed to be that which was traversed by Tamerlane on his way to the conquest of India, and by Alexander the Great on his return from Bactria. The three Hadjiyak passes, about 13,000 ft., lead from the head of the Cabool valley to Bamian in the basin of the Oxus, and are usually regarded as the limit of the Hindoo Koosh on the west, the name Koh-i-baba being applied to the western extension of the range. The Cabool and Helmund rivers rise on the southern slope of the watershed, and from the northern side flow several important tributaries of the Oxus. The Hindoo Koosh is characterized by excessive aridity and a remarkable absence of forests.

HINDOSTAN. See INDIA.

HINDS, a S. W. county of Mississippi, bounded E. by Pearl river and N. W. by the Big Black; area, 850 sq. m.; pop. in 1870, 30,488, of whom 20,659 were colored. It has a level surface and a rich soil. It is intersected by the New Orleans, Jackson, and Great Northern, and the Vicksburg and Meridian railroads, and the Raymond branch. The chief productions in 1870 were 10,619 bushels of rye, 410,553 of Indian corn, 58,304 of sweet potatoes, and 27,394 bales of cotton. There were 1,714 horses, 2,905 mules and asses, 4,274 milch cows, 1,034 working oxen, 7,071 other cattle, 4,179 sheep, and 14,330 swine; 2 manufactories of agricultural implements, 1 of boots and shoes, 2 of carriages, 1 of furniture, 1 of gas, 2 of iron castings, 1 of machinery, 3 of saddlery and harness, 4 of tin, copper, and sheet-iron ware, 2 bookbinderies, and 2 newspaper establishments. Capital, Jackson, which is also the capital of the state.

HINGHAM, a town of Plymouth co., Massachusetts, pleasantly situated on the S. side of Boston harbor, 14 m. S. of Boston, from which it has communication by the South Shore railroad; pop. in 1870, 4,422. It is a place of resort for residents of the city, and in summer steamers run daily to Boston. The fisheries employ several vessels, and the manufactures are of considerable importance. The

town contains a national bank, savings bank, insurance company, newspaper, 17 schools, and 8 churches. It was settled in 1635.

HINSDALE, a S. W. county of Colorado, formed in 1874 from portions of Conejos, Lake, and Saguache cos.; area, about 1,400 sq. m. It contains gold mines. Capital, San Juan City.

HINTON, John Howard, an English clergyman, born in Oxford, March 24, 1791. He first preached at Reading, and afterward at London, as minister of a Baptist congregation. He had the reputation of being an independent and original preacher, and he was a zealous advocate for the voluntary principle in religion and education. He edited the "History and Topography of the United States," completed in 1832 (American editions by S. L. Knapp, 2 vols. 4to, Boston, 1834; by J. O. Choules, with continuation, 2 vols. 4to, New York, 1853). He has also written "Memoirs of William Knibb;" "Theology, or an Attempt toward a Consistent View of the Whole Counsel of God;" "Elements of Natural History," &c. The complete edition of his works is in 7 vols.

HIOGO, or **Flojo**, a seaport town of Japan, pleasantly situated on the island of Nipon, on the bay and about 20 m. W. of the city of Osaka, of which it is the port; pop. about 20,000, including a small number of foreign merchants, mostly Germans. Being the best harbor of Japan, its opening to foreign trade in 1868, and its proximity to the most fertile districts of the empire, gave rise to great commercial activity. The exports are very considerable, especially of tea. The annual imports are valued at about \$7,000,000. Upward of 1,000 vessels enter the port annually. A railway to Osaka was opened in 1874.

HIPPARCHUS, an ancient astronomer, born in Nicæa, Bithynia, flourished in the middle of the 2d century B. C. We have no details of his life, and our knowledge of his astronomical discoveries is derived altogether from his disciple Ptolemy. He was the first who systematically attempted to classify the stars, and to determine their position and magnitude. To his catalogue we are indebted for our knowledge of the retrograde motion of the equinoctial points. He was the inventor of the planisphere, and he conceived the idea of marking the position of places on the earth by circles drawn perpendicular and parallel to the equator. His only work still extant is the "Commentary on the Phenomena of Aratus and Eudoxus," the best edition of which is that of Petavius (Paris, 1630).

HIPPARCHUS. See HIPPIAS and HIPPARCHUS.

HIPPARION, an extinct perissodactyl or uneven-toed mammal, belonging to the solidungulate (solid-hoofed or single-toed) division, which includes the horse and the ass, or the family *equidae*. In its skeleton it was decidedly horse-like, but, in addition to the single toe on each foot, it had an additional one on each side, raised from the ground, and pointing laterally backward, as in the hog and ruminants.

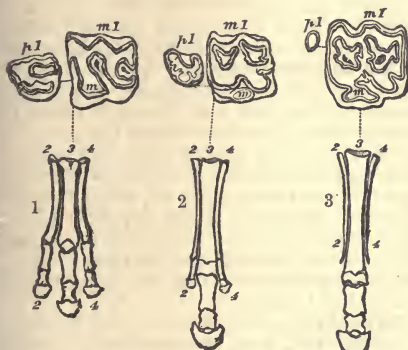
The enamel of the molar teeth was in more complex folds than in the present horse. Fossil horse-like animals have been found in the later tertiary and quaternary of North and South America, Europe, and northern Asia, and especially in the western regions of the United States. This genus has been obtained from the later tertiary of Europe, Asia, and North America. Of the species described by Hayden, *H. venustum*, half the size of the ass, has been found in South Carolina; *H. occidentale*, *speciosum*, and *affine*, from the pliocene of Dakota and Texas, about the size of an ass, are all nearly allied, if not the same species. *Protohippus*, *hippidion*, and *merychippus* are allied genera.—This series of horse-like animals is interesting from the point of view of the relation of past to present species, and of the derivation of the latter from the former; most naturalists of the present day, rejecting the principle of direct or miraculous creation, and recognizing a natural law or secondary cause, "the servant of predetermining intelligent

the modern horse first appears to have lost its lateral hooflets, and to have walked upon the end of the single second toe or digit, the two lateral splint bones being entirely internal and hoofless. He makes the series, from the hoofs and molar teeth, *palæotherium*, *paloplotherium*, *ancitherium*, *hipparion*, and *equus* (horse). To admit this does not require either the hypothesis of appetency or volition of Lamarck, the fitness of the surrounding medium of Geoffroy Saint-Hilaire, or the natural selection of Darwin; but simply the continuous operation of natural law or secondary cause, successively and progressively, "from the first embodiment of the vertebrate idea under its old ichthyic vestment, until it became arrayed in the glorious garb of the human form." (See Horse.)

HIPPEAU, Célestin, a French author, born in Niort, May 11, 1803. He studied in his native town, and in 1855 was sent on an educational mission to England, and in 1867 to the United States to report on American education. His principal works are: *Histoire de la philosophie ancienne et moderne* (1863); *Histoire du gouvernement de la Normandie* (9 vols., 1863-'73); and *Dictionnaire de la langue française au douzième et treizième siècle* (1873).

HIPPIAS AND HIPPARCHUS, the sons and successors of Pisistratus, tyrant of Athens. According to an early popular opinion, Hipparchus was the elder brother; according to Herodotus and Thucydides, Hippias. While they ruled jointly the government was conducted on the same principles as that of their father, and that period was subsequently regarded by the Athenians as a kind of golden age; but from the murder of Hipparchus by Harmodius and Aristogiton (514 B. C.) the character of the government of Hippias became arbitrary, exacting, and oppressive. His despotism was, however, at length overthrown. The Delphic oracle was bribed to favor the cause of liberty, and the pythonesse repeatedly enjoined the Lacedæmonians to free Athens from the despotism of the Pisistratidæ. A Spartan force under Cleomenes, having defeated Hippias in the field, and captured his children, compelled him to surrender the Acropolis, and to evacuate Attica with all his relatives (510). No sooner had they departed than a decree was passed condemning the tyrant and his family to perpetual banishment, and a monument was erected in the Acropolis commemorative of their crimes and oppressions. Hippias ultimately retired to the court of Darius, and there instigated the invasion of Greece. According to some, he fell at Marathon (490).

HIPPO, or Hippo Regius, an ancient city of Numidia, the ruins of which are still to be seen near Bona in Algeria. It was one of the residences of the Numidian kings, and afterward celebrated as the episcopal see of St. Augustine. It was taken and destroyed by the Vandals in 430. Its surname served to distinguish it from another town of the same name on the Carthaginian coast, W. of Utica.



1. Palæotherium. 2. Hipparion. 3. Horse

Will," as Prof. Owen has it, as operating in the production of species in orderly succession and progression. As proofs of the hypothesis that the existing are modifications of extinct species, changing by small degrees, it became important to collect a series of such intermediate forms from the fossil world. Prof. Owen, in his "Anatomy of Vertebrates," devotes a chapter to this subject, and especially mentions the series of anoplotherium, palæotherium, and hipparion, as supplying the links required by Cuvier to connect the pachyderms with the horse of the present day. In the accompanying illustration, *p* and *m* signify premolar and molar teeth, and 2, 3, 4 are the digits or toes. The palæotherium had three nearly equal toes, each with a hoof; the hipparion was also in one sense three-toed, but the lateral hoofs were spurious, not touching the ground; and it is interesting to note that these three-toed horses are found only in deposits of that tertiary period intervening between the older palæotherium and the newer strata in which

HIPPOCRATES, a Greek physician, called the "father of medicine," born in the island of Cos about 460 B. C., died in Larissa, Thessaly, between 375 and 351. He studied medicine with his father Heraclides, who belonged to the order of Asclepiadæ, or descendants of Æsculapius, and afterward went to Athens to place himself under the instruction of Herodicus. He was a pupil of the philosopher Gorgias of Leontini, and perhaps also of Democritus of Abdera. Having practised his profession in Cos, he travelled through Thessaly, Macedonia, and Scythia, and finally returned to Thessaly, where he passed the close of his life. The esteem in which he was held by his contemporaries renders very improbable the story that, having charge of a library at Cos or Cnidus, he made too free a use of the writings of others, and burned the collection to conceal his plagiarisms. Hippocrates raised medicine from a system of superstitious rites practised wholly by the priests to the dignity of a learned profession. He referred diseases to two leading causes, climate and diet, and regulated the latter to suit the changes of the former as well as the state of the patient. He taught that there were four humors in the human body, blood, phlegm, yellow bile, and black bile, an undue preponderance of any of which was a proximate cause of sickness. With such an imperfect knowledge of anatomy as might have been looked for in an age when superstition forbade the dissection of dead bodies, he nevertheless had some acquaintance with the structure of the cranium and viscera; but he was ignorant of the true relation between the arteries and the veins, and of the distinction between nerves, tendons, and ligaments, speaks of the muscles simply as flesh, and held some singular views on generation. He drew his principles from careful observation, and was little given to theorizing. He relied perhaps too much on the healing power of nature, and the remedies by which he assisted her were mostly of a simple character. He practised bleeding, cupping, cauterization, and auscultation, and used several mineral and vegetable remedies, including purgatives. He was particularly skilful in his diagnoses, and was the first to divide the course of a disease into three periods, for the last of which, called the crisis, he assigned certain days known as the critical days. Of the 72 books which bear the name of Hippocrates, only the "Aphorisms," "Prognostics," "Epidemics," the treatise on "Air, Water, and Locality," the treatise on "Diet," and a few others, can be attributed with much probability to the subject of this notice. Many were doubtless written by other physicians of the same name, of whom there were no fewer than seven among the Asclepiadæ. Hippocrates wrote in the Ionic dialect, in a concise and sometimes obscure style. The best editions of his works are those of Fœsius (fol., Frankfurt, 1595); Van der Linden (2 vols. 8vo, Amsterdam, 1665); Mack (2 vols. fol., Vienna, 1748-'9);

Littré (8 vols. 8vo, Paris, 1839-'53), with a French translation; Upman (3 vols. 8vo, Berlin, 1847); Ermerius (Utrecht, 1862-'4); and Reinhold (Athens, 1864-'5). There are English translations of the aphorisms and the treatises on "Air, Water, and Situation, upon Epidemical Diseases and upon Prognostics," &c., by Francis Clifton, M. D. (8vo, London, 1734), and of the "Genuine Works" of Hippocrates by Adams (2 vols. 8vo, London, 1849).

HIPPOCRENE (Gr. ἵππος, horse, and κρήνη, fountain), called by Persius *Fons Caballinus* (the fountain of the horse), a fountain on Mount Helicon in Bœotia, owing its name to a myth according to which it was produced by Pegasus striking the ground with his hoofs. (See **HELICON**.)

HIPPODROME (Gr. ἵππος, horse, and δρόμος, a course), the course where the horse and chariot races of the ancient Greeks took place. The hippodrome was differently constructed according to the nature of the ground. In level countries artificial mounds were raised on both sides of it; in hilly districts a declivity was invariably chosen to form one side. The artificial mounds, or mound and declivity as the case might be, were connected at the inner end by a semicircular barrier. At the other or outer extremity was the portico, where each chariot had its stall, and whence it issued as soon as the cord which crossed the entrance was removed. A bronze eagle and dolphin were used as a signal at the time of starting; the eagle was raised in the air, while the dolphin was lowered. Along the sides of the hippodrome seats were erected for the spectators, special seats being reserved for the judges. The most celebrated of Hellenic hippodromes was that of Olympia.

HIPPOLYTUS, son of Theseus. See **PLEADRA**.

HIPPOLYTUS, Saint, an ecclesiastical writer of the 3d century. Although his writings had been always numbered among those of the ante-Nicene fathers, his personal history had been surrounded with uncertainty until the middle of the present century. Two events, occurring at a distance of 300 years from each other, have served to clear away doubts and contradictions regarding his identity. In 1551, near the basilica of San Lorenzo in Rome, there was discovered an antique statue (now in the Vatican museum) belonging to the 6th century, which represented a bishop seated. The statue bears the inscription *Hippolytus Episcopus Portuensis*, the very title given to him by Prudentius, who lived in the 5th century. On the back of the chair are the paschal canon or cycle introduced by Hippolytus in the Roman church, and a list of his works, among which are mentioned treatises "against heresies." In 1842 M. Mynioe Minas, commissioned by the French government, had brought back from the monastery of Mount Athos a mutilated Greek manuscript on cotton paper containing a "Refutation of all Heresies" (Κατὰ πᾶσων Ἀιρέσεων Ἐλεγχος), which was published at Ox-

ford in 1851, as a work of Origen. This authorship was immediately contested by Dr. Jacobi in Berlin and Dr. Duncker in Göttingen, who both claimed the work as belonging to Hippolytus. Finally this claim was successfully sustained by Bunsen in his "Hippolytus and his Times" (4 vols. 8vo, London, 1851), and in a second enlarged edition of the same work, under the title "Christianity and Mankind" (7 vols. 8vo, 1854). The light thrown on Hippolytus and his writings by Bunsen's conclusions, now generally adopted by critics, gives unity to the traditions, and explains the contradictions respecting him. The work "Against Heresies," specified in the inscription on the statue, is claimed as his own by the author of the Mount Athos manuscript, and is attributed by the most eminent authorities to Hippolytus, bishop of Portus, presbyter of the Roman church, who lived and wrote about 220, as the "Paschal Cycle" and his statue expressly state. It is thus established that he was a disciple of Irenæus, a member of the Roman presbytery, appointed (most likely because of his knowledge of Greek) bishop of the *Portus Romanus* or *Romæ*, the new harbor of Rome, established by Trajan on the right bank of the Tiber, over against the more ancient Ostia. He is called "bishop of the Gentiles," because the population of the new city was made up of floating masses of heathen strangers, drawn thither by commerce. In 218 he was actively ministering to them; in 222 he was engaged in a violent opposition to Pope Calixtus I., whose mild treatment of repentant sinners he reprobated; in 235, in all likelihood immediately after the death of Alexander Severus, he was by the order of Maximin banished to Sardinia, together with Pontianus, bishop of Rome; was permitted to return to his see in 236; and not long after was put to death, as the tradition quoted by Prudentius states, by being torn to pieces by wild horses. Prudentius also informs us that he visited his tomb in the church of St. Laurentius in Rome, and Bunsen is of opinion that the statue discovered in 1551 was erected on the removal of his relics. The doctrine of Hippolytus on the Trinity and the incarnation of the Word is that proclaimed at Nicæa a century later, and his philosophical explanations of dogma show him to belong to the Platonic school. The best editions of his works are that of Fabricius (2 vols. fol., Hamburg, 1716-'18), reproduced with important additions by Galland in vol. ii. of his *Bibliotheca Patrum* (Venice, 1766), and that of Lagarde (Leipsic, 1858).

HIPPONAX, a Greek lyric poet of the latter half of the 6th century B. C. He was a native of Ephesus, was banished by its tyrants Athenagoras and Comas, and afterward lived in Clazomenæ in extreme poverty. He was small and ugly in person, and was one of the severest of Greek satirists. His favorite themes were the effeminacy and vices of his fellow citizens, and

the faithlessness of women. The Chian sculptors Bupalus and Athenis, who made caricature statues of him, were assailed in the bitterest of his satires. Of the poems of Hipponax about 100 lines are still extant.

HIPPOPOTAMUS (Gr. ἵππος, horse, and ποταμός, river), a pachydermatous animal, inhabiting Africa. It is generally called sea cow by the Cape colonists, a term which is usually applied in America to the manatee. The dental formula is: four incisors in each jaw, long, cylindrical, pointed, and inclined forward below, short, conical, and curved above; canines four, resembling the incisors of rodents, the upper ones straight, the lower thick and bent, overlapping the upper; the molars six on each side in each jaw, the anterior three more pointed, and the posterior with the points in the adult worn in a trefoil shape. Its powerful jaws, sub-cylindrical lower incisors, and chisel-edged canines are formed for tearing and crushing rather than grinding the coarse tough plants and aquatic roots and grasses upon which it principally feeds; the canines seem excessively developed. In its skull the hippopotamus resembles the hog in the connection of the bones and their sutures, in other respects being more like the ox; the skeleton is very massive, indicating the great size and strength and rather slow locomotive powers of the animal. The skull is remarkable for the horizontal plane of its upper portion, the eyes, nostrils, and ears of the animal when in the water being nearly upon the same level, and the upper part of the head, when this alone is visible, looking not unlike that of a horse; the bony orbits are very prominent, projecting above the top of the skull. The stomach is multiple, something as in ruminants, though it is not known to chew the cud; it can contain five or six bushels of vegetable matter, and the large intestine is about 8 in. in diameter; the intestinal canal, without cæcum, is nearly 12 times as long as the body, considerably more than 120 ft. The average length of the male from the end of the nose to the tip of the tail (the latter being about a foot) is 14 ft., but they have been known to measure 17 ft.; the females are much smaller; the girth is nearly equal to the length, and the height at the shoulders between 5 and 6 ft.; the aperture of the mouth is about 2 ft. wide, and the tusks are more than a foot long. This huge uncouth body, of a form between that of an over-fed pig and a fattened ox, is supported on short stout limbs, with four toes on each small foot, nearly equal and with short hoofs; the massive head is broad, and the expression of the face singular from the high position of the eyes; the lips are wide and tumid, especially the upper, concealing the teeth when the mouth is shut, and furnished with a few tufts of hair; the nose is broad and truncated, and the nostrils, on the end and capable of protrusion so that the animal may breathe when all the body is under water, may be closed during submerision; the prominent eyes enjoy great freedom

of motion, and may be protruded or retracted to adapt its vision to an air or water medium; the last two contrivances are admirably adapted for the protection of an aquatic animal so wary and sluggish as the hippopotamus. The head is contracted behind the angles of the mouth, and the forehead is broad and flat; the ears are only 3 or 4 in. long, fringed and lined internally with a fine hair, just behind and but little above the eyes; the eyebrows are tumid, which makes the eyes appear deeply seated; the neck is short, thick, and hog-like, the back slightly arched, the body cylindrical, the nates full, the pendent abdomen almost touching the ground, the tail short, robust, and edged with wiry hairs, the mammae two in number and ventral, and the skin nearly naked. The color, when the skin is dry, is reddish gray, brownish on the back, lighter beneath; under water the colors are various shades of blue. Prof. Owen, in the "Annals and Magazine of Natural History," vol. v., 1850, gives some interesting particulars from a young living specimen received at the zoological gardens of London in 1850, the first seen alive in Europe since the time of the emperor Gordian III. in Rome in the 3d century. This animal was captured on the banks of the Nile in August, 1849, and was supposed to have been recently brought forth, as it was not much larger than a new-born calf, though stouter and shorter legged; it arrived in London in May, 1850, and was accordingly then about ten months old, yet it was 7 ft. long and of 6½ ft. girth in the middle of the body. The hind limb was buried in the skin of the flank nearly to the prominence of the heel; there was no trace of a glandular orifice, as in the rhinoceros, behind each foot; the naked skin, of a dark India-rubber color, and with fine transverse wrinkles, glistened with a sebaceous secretion as the animal emerged from the water; the eyes had a thick nictitating membrane, and the mouth a peculiar upward curve of its angles toward the eyes, which gave a comical expression to the massive countenance. Apparently in perfect health, it breathed three or four times in a minute, slowly and regularly; its food consisted of a kind of porridge of milk and maize meal, though it was more than half weaned from its baby diet. Other specimens have since been received at the zoological gardens, and also at the Paris *jardin des plantes*, and one has been exhibited in the United States. Several species are described, but the best known and most extensively distributed is the *H. amphibius* (Linn.), which was formerly found from Egypt to the Cape of Good Hope in all the large rivers, though now it is rare except in the lonely regions explored by Livingstone and Cumming. Of whatever species, they spend most of their time in the water, lolling about in a dreamy manner, frolicking like a porpoise, or wallowing in the mud like a hog; they leave the rivers chiefly at night to crop the succulent grasses on their banks, especially in localities

where brushwood abounds; they are also fond of passing the day in the ocean, near the mouths of rivers. Though clumsy upon the land, their movements in the water are graceful and rapid; they are gregarious, and both sexes delight to congregate at all seasons of the year in small



Hippopotamus amphibius.

herds; they can remain under water for about 15 minutes, walking upon the bottom, and probably longer if necessary; but it is not known whether this ability to sustain prolonged immersion is owing to an apparatus like the venous reservoirs of the seals, the arterial plexiform receptacles of the whales, or some other equivalent structure. They are playful, peaceable, and inoffensive when undisturbed; but if wounded, and especially if in company with their young, they are savage and eager to assail any enemy; the males in the love season are quarrelsome, and both sexes are often seen covered with scars; it is said that the young males are often killed by the older ones. The males are darker colored than the females. The period of gestation is about nine months, and a single young one is brought forth on land, taking to the water instantly when alarmed; the very young ones are carried in the water on the neck of the mother, and when they grow older on the withers. When they blow, they puff up the water about 3 ft. high, according to Livingstone. The sagacity of the hippopotamus, though inferior to that of the elephant, is considerable, as evinced by its adroitness in avoiding its enemies on land or in the water, its escaping from pitfalls and other stratagems of the natives, its going with its young to distant localities when annoyed by man, and its caution in exposing itself even in its watery abode when it has been once assailed. They are hunted for their flesh, which resembles pork; for the *speck* or layer of fat just under the skin, a *bonne bouche* for the Cape Town epicure; for their teeth, which are valuable articles of trade, and were formerly much

employed for their hardness in the manufacture of artificial teeth, and for various ornamental purposes; and for their tough skin, which is made into shields and helmets, and cut into cylindrical strips, which form the whips of the Cape colonists. The voice of the animal is between a grunt and a neigh, and has been compared by travellers to a variety of discordant sounds. Its voracity is very great, and its destruction of the native crops, both by devouring and treading them down, has been known and deplored from the earliest antiquity. Besides man, the principal enemy of the hippopotamus, and in its own element, is the crocodile; the ancients believed that an inextinguishable enmity existed between these animals, but both are so well armed and defended that they probably do not very often attack each other. This animal was well known to the ancients, and it figures under many shapes in their writings; accurate representations are given on Roman coins and Egyptian sculptures; it was occasionally seen in their triumphal pomps and gladiatorial shows. Since the time of Bochart the behemoth of the Hebrews has been supposed by many to be the hippopotamus, and some of the verses in the 40th chapter of Job well apply to this animal; some authors, however, Milton among the rest, deny that these animals are the same, without throwing any light upon what the behemoth really is.—For interesting details on the method of hunting these unwieldy creatures, see Gordon Cumming's "Hunter's Life in Africa," and Andersson's "Lake Ngami, or Explorations and Discoveries during Four Years' Wanderings in the Wilds of S. W. Africa;" and for notices of their character and habits, Livingstone's "Travels and Researches in South Africa."—The hippopotamus is found fossil in the tertiary and diluvial formations of Europe and Asia.

HIRAM, a township of Portage co., Ohio, 33 m. S. E. of Cleveland; pop. in 1870, 1,234. It is situated on the range of hills dividing the waters that flow N. to Lake Erie from those flowing S. to the Ohio river, about 2 m. from the Mahoning branch of the Atlantic and Great Western railroad. It is the seat of Hiram college, under the charge of the Disciples. This institution was founded as the Western Reserve eclectic institute in 1850, and its name was changed in 1867. The building occupies a healthy site, commanding fine views. In 1872-'3 there were 9 professors and instructors; number of students 286, of whom 126 were females, including 35 collegiate and 7 preparatory students, 19 in the commercial course, and 51 in the normal class. The rest were pursuing English and selected studies. The libraries contain 2,500 volumes.

HIRING. One may hire a person or a thing, and the thing hired may be real estate or personal chattels. For the law of hiring real estate, see **LEASE**. In this article we shall treat only of the hiring of persons, and of the hiring of chattels. In England the relation of mas-

ter and servant is peculiar, and is perfectly recognized both by custom and by law, and it is governed by principles which apply to no other relation. In the United States it is simply one of contract—so much work for so much wages; and it is governed by the ordinary rules of the law of contract. If the servant is disobedient or negligent, it may be a good ground for withholding wages, or for discharge, according to circumstances; and if he does any injury he is responsible in damages; and this is all. If a servant contracts to labor for a definite period, and leaves the service without excuse before that period has elapsed, it is held in a majority of the states that he can recover nothing; but in some, following a New Hampshire decision, it is decided that he may recover what his services actually performed are worth, not exceeding the contract price, but subject to a deduction of all damages sustained by the master for the breach of contract. This rule would seem to work justice to both parties. If, however, the servant leaves because of ill treatment, or is driven away, or is sick, or has any good cause for leaving, he may under all the cases recover wages for the time he has served. On the other hand, a servant who is hired for a certain term, and is turned away before the time is up, without good cause, may tender his service for the whole period, and keep himself ready to render it, and can then recover for the whole period. The question how far a master is responsible for the acts of his servant will be considered, with some connected questions, under the title **SERVANT**.—We will now pass to the hiring of a chattel. In one sense a ship is a chattel; but the hiring of a ship will be treated under **SHIPPING**. The contract of hiring a chattel is for the mutual benefit of the owner and the hirer; the hirer is therefore bound, not to extreme care, but to ordinary care, which is defined as that care which a man of ordinary capacity would take of his own property under ordinary circumstances; and he is responsible for any injury caused by a want of such care. This obligation varies with the thing hired; it is one degree of care with a costly watch or jewel, or a valuable horse, and another with coarser and cheaper things. The hirer is, in general, as responsible for the negligence of his servants about the thing hired as for his own. Whether he would be responsible for a wilful injury by his servant would depend somewhat on circumstances, and may not be certain from the authorities; but we should say, in general, that he would not be so responsible. It may be said that he is not responsible for injury caused by the theft, robbery, or violence of others, unless his own negligence or default caused or facilitated the wrong. If he sells the chattel or gives it away, he can pass no title, and the owner may demand and take it from the receiver or from any buyer, even if he bought in honest ignorance of the owner's title, and paid full price for it. The obligations of the owner of a thing hired

may be stated thus: he must deliver it in good condition for the intended and agreed or customary use, and keep it in good order, or pay the hirer his reasonable expense for so keeping it, as for example a carriage and horses hired for a journey; he must not interfere with the hirer's lawful and reasonable use of it; but if the hirer makes of it a use which he has no right to make, the owner may peaceably repossess himself of it, or have his appropriate action; and if the hirer refuses it, the owner may recover damages, although he repossess himself of the thing. The right and obligations of the hirer may be thus stated: he may use it in the intended and agreed or customary way, and must not use it in any other way; he must not abuse or injure it in any way, must surrender it at the time agreed upon, or if no time be agreed on, then whenever, within a reasonable time, it is demanded by the owner; and he is bound to pay the agreed price, or, if none was agreed, a customary and reasonable price. Nearly all, or indeed all, these particulars are open to the agreement of the parties, if they choose to provide expressly for them.

HIRPINI, an ancient people of Italy, of Samnite race, whose name is said to come from the Sabine word *hirpus*, a wolf. They dwelt in the southern part of Samnium, W. of Apulia, N. of Lucania, and E. of Campania. At the time of the second Punic war they were independent of the Samnites. They took up arms against Rome during the social war. Their chief places were *Æculanum* and *Aquilonia*.

HIRSCHBERG, a town of Prussia, in the province of Silesia, at the entrance of the Zacken into the Bober, 30 m. S. W. of Liegnitz; pop. in 1871, 11,773. It consists of the town proper, surrounded by walls with three gates, and three suburbs. It has a Protestant and three Catholic churches, a gymnasium, a female high school, a mechanics' institution, a chamber of commerce, and a garrison. It is the centre of the linen industry of Silesia, and has also manufactories of cloth, veils, chinaware, machines, and paper, bleaching grounds, and dye works. A considerable trade is carried on in linen and veils. The Hausberg, Cavalierberg, Helicon, and Sattler are eminences near Hirschberg, with beautiful pleasure grounds.

HIRST, Henry B., an American poet, born in Philadelphia, Aug. 23, 1813, died there, March 30, 1874. He was admitted to the bar of his native city in 1843, his youth having been spent in the study of law, frequently interrupted by mercantile duties. He published "The Coming of the Mammoth, the Funeral of Time, and other Poems" (Boston, 1845); "Eudymion, a Tale of Greece" (1848); and "The Penance of Roland, and other Poems" (1849).

HIRTIVS, Aulus, a Roman statesman, born about 90 B. C., fell in battle near Mutina (Modena) in 43. He was a friend of Julius Cæsar, under whom he served as legate in Gaul (58), and one of the 10 prætors nominated by him for the year 46. During Cæsar's absence in

Africa he lived principally at his Tusculan estate, which was contiguous to the villa of Cicero, who was his personal friend, although opposed to him in politics. In 44 he received Belgic Gaul as his province, but governed it through a deputy, remaining in the capital in continued intimacy with Cæsar, who nominated him, together with Vibius Pansa, as consul for the next year. After Cæsar's assassination he retired to the country. Though not fully recovered from a dangerous illness, and politically undecided, he entered upon his duties as consul, Jan. 1, 43. He finally declared against Antony, and was sent at the head of an army to join Octavius, and relieve Decius Brutus, then besieged by Antony in Mutina. He fell while leading his victorious troops to an assault. He has been supposed to have written the eighth book of Cæsar's Commentaries on the Gallic war, and the histories of his Alexandrian and African campaigns; but the authorship of all these is also claimed for Oppius.

HISPANIA. See SPAIN.

HISPANTOLA. See HATTI.

HISTLEA, or OREUS, an ancient city of Eubœa, on the river Callas, at the foot of Mt. Telethrium. It ranked among the oldest and most important of the Eubœan cities. Occupied by the Persians after the battle of Artemisium (480 B. C.), it afterward successively became subject to the Athenians (who, in consequence of a revolt in 445 B. C., displaced its inhabitants for Attic colonists, and changed its name to Oreus) and to the Spartans. During the wars of Alexander's successors, and those of the Romans and Macedonians, Oreus was a place of great strategic importance.

HISTOLOGY (Gr. *ιστος*, a web, and *λόγος*, a discourse), the science which describes the anatomical elements and tissues of the body, according to their form and organization. If we take any organ of the body, such as a muscle or a nerve, and subject it to minute dissection, we find that it can be divided into smaller and smaller portions, by simply separating from each other the various parts of which it was composed. Thus a muscle is distinctly fibrous in appearance to the naked eye, being formed of parallel bundles which may be successively separated from each other in dissection, by removing the intervening material. But the possibility of thus dividing an organ into smaller and smaller parts, similar to each other, has its limits; for, after it has been carried to a considerable extent and the parts are reduced to microscopic size, we then come in every instance to certain definite anatomical forms, which can no longer be divided in the above manner. They can still of course be divided or disintegrated by mechanical means; but this will be no longer a separation into similar parts already distinct from each other, but simply an artificial mutilation of its substance. Such a definite form, to which the organ is reduced in its minutest natural subdivision, is called an anatomical element. It is readily distinguished, as a

general rule, under the microscope, by its size, form, color, consistency, and chemical relations. Thus the striped muscular fibre of the voluntary muscles, and the smooth muscular fibre of the internal organs, are anatomical elements. The red globules and the white globules of the blood are two different anatomical elements, both mingled with the plasma of the circulating fluid. The tendons, ligaments, and periosteum contain a minute, white, straight, inelastic but very strong fibre, which is their most abundant and characteristic anatomical element. Other membranes and organs contain a larger, flattened, curled, yellowish, elastic fibre, which communicates to them the property of elasticity in proportion to its own abundance. These two kinds of fibre are also distinguished from each other by their reaction with dilute acetic acid; the white inelastic fibre becoming rapidly swollen and transparent by contact with this reagent, while the yellow elastic fibre is not affected by it. Other anatomical elements which may be enumerated are bone corpuscles, nerve cells, pavement, columnar and ciliated epithelium cells, glandular cells, adipose vesicles, cartilage cells, capillary tubes, &c.—When two or more kinds of anatomical elements are mingled together and interwoven in a determinate manner, they form a tissue, just as woollen or cotton threads interwoven with each other form a web or textile fabric; and the animal tissues, like artificial fabrics, derive their appearance, qualities, and texture from the number and variety of anatomical elements of which they are made up, and the particular manner in which they are interwoven. It is very rare that a tissue consists of but a single anatomical element. The tissue of the crystalline lens, containing only flattened fibres with finely toothed edges, and that of cartilage, containing only cartilage cells with an intervening hyaline substance, and certain epithelial tissues, are perhaps the sole examples of this in man and the higher animals. Generally speaking, a tissue consists of several anatomical elements, one of which is peculiar to it, the others perhaps common to several tissues. Thus muscular tissue consists of muscular fibres, arranged in parallel bundles, with ultimate nervous filaments and capillary blood vessels; the bundles themselves being surrounded by a thin layer of connective tissue, and associated into secondary and tertiary bundles of larger and larger size, with the trunks and branches of nerves and blood vessels ramifying between them. The liver contains a peculiar anatomical element, the glandular liver cells; but these are arranged in definite groups, forming the lobules or acini, with the intra-lobular capillary blood vessels, the commencement of the hepatic ducts, and the terminal filaments of the hepatic plexus of the sympathetic nerve.—In the study of histology the different powers of the microscope are employed for different objects. The highest powers are generally requisite for the examination of the ultimate ana-

tomical elements. But in order to learn in what form these elements are associated with each other, or how they are interwoven with still different ones—to ascertain, in short, the structure of the tissue—the lower powers must be employed; since a very highly magnifying lens can only be used when the tissue has been minutely subdivided, and this destroys of course the natural arrangement of its parts. Certain artificial aids and contrivances are often also of great value in bringing into view peculiarities of texture which would otherwise remain invisible, such as the injection of minute vessels with colored fluids, and the staining of the tissue with certain reagents, such as iodine, nitrate of silver, and the like, which will attack some of its anatomical elements and leave others entirely or comparatively unaffected. Thus two different anatomical forms which were originally so similar in color, consistency, and refractive power that they could not be distinguished by the microscope, may have their outlines made visible and easily recognized in the surrounding parts. These manipulations, however, should be used with great caution and judgment; otherwise deceptive appearances, produced by the action of reagents, such as the shrivelling of membranes, the contraction or enlarging of fibres, or the coagulation of soft material, may sometimes be mistaken for the natural characters of the tissue.—The best works on histology, often called microscopic anatomy, are those of Kölliker, *Handbuch der Gewebelehre* (Leipsic, 1852; translated by Busk and Huxley, Sydenham society publications, London, 1853, and Philadelphia, 1854); Peaslee, "Human Histology" (Philadelphia, 1857); and Stricker, *Lehre von den Geweben des Menschen und der Thiere* (Leipsic, 1869-'71).

HIT (anc. *Is*), a town of Asiatic Turkey, in the vilayet and 70 m. W. N. W. of the city of Bagdad, on the W. bank of the Euphrates; pop. about 2,000. It is situated on a hillside, and the streets are narrow, dirty, and often steep. The houses are chiefly of clay, one or two stories in height. A graceful minaret and some tombs are the only buildings worthy of notice. The inhabitants are employed in boat building and the preparation of wool, salt, naphtha, and bitumen, for which last the place has been famous for ages. Thothmes III. brought bitumen from Hit to Egypt about 1400 B. C. According to Herodotus, the bitumen of Is was used in the building of Babylon.

HITCHCOCK, a S. W. county of Nebraska, recently formed, and not included in the census of 1870; area, 720 sq. m. It borders on Kansas, and is watered by the Republican river.

HITCHCOCK, Edward, an American geologist, born in Deerfield, Mass., May 24, 1793, died at Amherst, Feb. 27, 1864. He was principal of the academy in his native place from 1815 to 1818; pastor of the Congregational church in Conway, Mass., from 1818 to 1825; professor of chemistry and natural history in Amherst college from 1825 to 1845; president of the

college from 1845 to 1854; and professor of natural theology and of geology there from 1845 till his death. He was appointed state geologist of Massachusetts in 1830, of the first district of New York in 1836, and of Vermont in 1857, and was for several years a member of the Massachusetts board of agriculture. In 1850 he was commissioned by the government of Massachusetts to examine the agricultural schools in Europe. His life was in a great measure identified with the history of Amherst college. During his presidency of ten years he procured for it buildings, apparatus, and funds to the amount of \$100,000, doubled the number of students, and established it on a solid pecuniary as well as literary and scientific basis. He began his career as an author by the preparation of an almanac, which he conducted for four years (1815-'18), and the publication of a tragedy, "The Downfall of Bonaparte" (1815). His first important contribution to science was a paper on "The Geology and Mineralogy of a Section of Massachusetts on the Connecticut River," with a map, published in the first volume of the "American Journal of Science" (1818), to which he became a frequent contributor. About the same time he gave an account of Bailey's new method of longitude. As state geologist he was added to the corps who had charge of the trigonometrical survey of Massachusetts. His first report, a pamphlet of 70 pages, on the economical geology of the state, was published in 1832. In 1833 he made a full report, containing about 700 pages, with an atlas of plates and a geological map. In 1837 he was commissioned to reexamine the geology of the state, which resulted in a final report of two 4to volumes of 840 pages, with 56 plates and 82 woodcuts (1841). After this he made several reports on the hematite of Berkshire county, and also a report on the "Ichnology of New England," the result of more than 20 years of study, which was published by the state (1840; supplement in 1865). In 1856, while suffering from physical infirmities, he commenced with his two sons the geological survey of Vermont, which was successfully completed, the report of the work appearing in 1862. His last geological paper of importance was "New Facts and Conclusions respecting the Fossil Footmarks of the Connecticut Valley," in the "American Journal of Science," July, 1863. He published more than 20 volumes. Among those not already mentioned are: "Geology of the Connecticut Valley" (1823); "Catalogue of the Plants within Twenty Miles of Amherst" (1829); a prize essay on the "Wine Question," an "Argument for Early Temperance," and "Lectures on Diet, Regimen, and Employment" (1831); "History of a Zoological Temperance Convention in Central Africa," and "Lectures on the Peculiar Phenomena of the Four Seasons" (1850); "Memoir of Mary Lyon," and "Religion of Geology" (1851); and "Illustrations of Surface Geology," published by the Smith-

sonian institution (1857). His "Elementary Geology" (1840; revised and enlarged, with a preface by J. Pye Smith, London, 1854) has passed through many editions in America and England. His last literary work was "Reminiscences of Amherst College" (1863). He was the first to give a scientific exposition of the fossil footprints of the Connecticut valley, and with him ichnology as a science began. (See FOSSIL FOOTPRINTS.) He suggested as well as executed the geological survey of Massachusetts, the first survey of an entire state under the authority of government in the world. The American geological association (now the scientific association) was originated at his suggestion, and he was its first president.—His son, CHARLES H., was associated with him in the geological survey of Vermont, after which he was engaged in a survey of Maine for two or three years, and was subsequently appointed professor of geology in Dartmouth college, and state geologist of New Hampshire.

HITCHCOCK, Ethan Allen, an American author, born at Vergennes, Vt., May 18, 1798, died at Hancock, Ga., Aug. 5, 1870. His mother was a daughter of Ethan Allen. He graduated at West Point in 1817, became assistant instructor in tactics there in 1824, and from 1829 to 1833 was commandant of cadets and instructor in infantry tactics. During the war with Mexico he took part in all of Gen. Scott's battles, and served a part of the time as inspector general, receiving brevets as colonel and brigadier general. From 1851 to 1853 he was in command of the Pacific division, and in 1854-'5 at Carlisle barracks. In October, 1855, he resigned his commission in consequence of the refusal of Jefferson Davis, then secretary of war, to confirm a leave of absence granted by Gen. Scott, and afterward resided in St. Louis, devoting himself mainly to literary pursuits. On the breaking out of the civil war he reentered the army, and was appointed major general of volunteers, Feb. 10, 1862, and acted as military adviser to President Lincoln, on the commission for the exchange of prisoners, and on that for revising the military code. He published "Remarks upon the Alchemists" (1857); "Swedenborg a Hermetic Philosopher" (1858); "Christ the Spirit" (1860); "Red Book of Appin, and other Fairy Tales" (1863); "Remarks on the Sonnets of Shakespeare" (1865); "Spenser's Colin Clout explained" (1865); and "Notes on the Vita Nuova of Dante" (1866). All his works are intended to enforce the notion that a very subtle and elevated theology and philosophy were taught hermetically by a great variety of writers.

HITCHCOCK, Roswell Dwight, an American clergyman, born at East Machias, Me., Aug. 15, 1817. He graduated at Amherst college in 1836, and in 1838-'9 was a member of the theological seminary at Andover. He was a teacher during one term at Phillips academy, Andover, and in 1839-'42 tutor at Amherst college. In 1842-'4 he was a resident licentiate at An-

dover seminary, and on Nov. 19, 1845, was ordained pastor of the first Congregational church in Exeter, N. H., which office he held till 1852, although spending the year 1847-'8 in study in Germany. In 1852 he was appointed professor of natural and revealed religion in Bowdoin college, and in 1855 of church history in the union theological seminary, New York, which office he still holds (1874). During the civil war he delivered a number of addresses upon national affairs, taking a very earnest stand in favor of the government. In 1866 he visited Italy and Greece, and in 1869-'70 Egypt, Sinai, and Palestine. After his return he took an active part in the organization of the Palestine exploration society, and in 1871 was elected its president. In 1869 he was elected a trustee of Amherst college. He received the degree of D. D. from Bowdoin college in 1855, and of LL. D. from Williams college in 1873. He has published a "Complete Analysis of the Bible" (New York, 1869), and numerous orations, addresses, and sermons. He has also contributed many important articles to the religious periodical press, and was one of the editors of the "American Theological Review" from 1863 to 1870.

HITTORFF, Jacques Ignace, a French architect, born in Cologne, Aug. 20, 1793, died in Paris, March 25, 1867. He worked for a time as a mason, but became in 1810 a pupil of the school of fine arts in Paris, and in 1818 architect of the government. He studied in Sicily the remains of Greek architecture, and from 1824 was engaged in the construction of important public buildings. The church of St. Vincent de Paul is generally regarded as his masterpiece. The embellishments in the Champs Elysées, the Bois de Boulogne, and other places, were also designed by him. He followed the ancient Greek artists in applying colors to most of his architectural designs. He was elected in 1853 to the academy of fine arts. His writings include *Architecture antique de la Sicile* (3 vols., Paris, 1826-'30); *Architecture moderne de la Sicile* (3 vols., 1826-'30); *Architecture polychrome chez les Grecs* (1831); and *Mémoire sur Pompéi et Petra* (1866).

HITZIG, Ferdinand, a German Biblical critic, born in Baden, June 23, 1807. He graduated at Göttingen in 1829, and in 1833 was called to Zürich as professor of theology, his lectures comprising the New Testament and the Semitic and other oriental languages. He has published *Begriff der Kritik am Alten Testament* (1831); *Des Propheten Jonas Orakel über Moab* (1831); translations of and commentaries upon Isaiah (1833), the Psalms (1835 *et seq.*), the twelve minor prophets (1838; 3d ed., 1863), Jeremiah (1841), Ezekiel (1847), Daniel (1850), and Canticles (1855). Among his other writings are: *Die Erfindung des Alphabets* (1840); *Ueber Johannes Marcus und seine Schriften* (1843); *Urgeschichte und Mythologie der Philistiner* (1845); *Die Grabchrift des Eschmunazar* (1855); *Geschichte des Volkes Israel*

(1866 *et seq.*); and *Die Inschrift des Mesha* (1870).

HOADLEY, I. Benjamin, an English prelate, born at Westerham, Nov. 14, 1676, died in Chelsea, April 17, 1761. After leaving Cambridge he was lecturer of St. Mildred's and rector of a church in London, and became known by his controversies with Atterbury and the high-church party; and his "Measure of Obedience," on the doctrine of non-resistance, so pleased the commons, that in 1709 they petitioned the queen for his preferment. After the accession of George I. he was made successively bishop of Bangor in 1715, Hereford in 1721, Salisbury in 1723, and Winchester in 1734. In 1717, while bishop of Bangor, he preached his celebrated sermon on the words, "My kingdom is not of this world," asserting the supreme authority of Christ as king in his own kingdom, and that he had not delegated his power, as absent temporal rulers sometimes do, to any persons as his vicegerents or deputies. In these positions he was assailed by William Law, and the discussion became so violent in the convocation that the body was prorogued in 1717, and not again permitted to meet for general business. His writings were collected and published by his son John Hoadley (3 vols. fol., London, 1773). Akenside has paid a handsome tribute to his memory. **II. Benjamin**, son of the preceding, born in London, Feb. 10, 1706, died in Chelsea, Aug. 10, 1757. He entered Cambridge university in 1722, graduated as doctor in medicine in 1729, and then settled in London, where in 1742 he became physician to the royal household, and in 1746 to the household of the prince of Wales, continuing to hold both offices at the same time. He produced in 1747 his comedy of "The Suspicious Husband," assisted Hogarth in his "Analysis of Beauty," and in 1756 published, in connection with Mr. Wilson, "Observations on a Series of Electrical Experiments." **III. John**, brother of the preceding, born in London, Oct. 8, 1711, died March 17, 1776. He was educated at Cambridge, and studied law, but did not practise; was admitted to orders in 1735, was chaplain to the prince of Wales and the princess dowager, prebendary of Winchester, rector of St. Mary's near Southampton and of Overton, and master of St. Cross. He was the author of "Love's Revenge," a pastoral (1737); "Jephtha," an oratorio (1737); "Phœbe," a pastoral (1748); and "The Force of Truth," an oratorio (1764). He wrote the fifth act of Miller's "Mahomet," is supposed to have had a share in the composition of his brother's "Suspicious Husband," revised "Lillo's "Arden of Feversham," and edited his father's works.

HOANG-HAI. See YELLOW SEA.

HOANG-HO. See CHINA, vol. iv., p. 442.

HOAR, Ebenezer Rockwood, an American jurist, born at Concord, Mass., Feb. 21, 1816. His father, Samuel Hoar, was sent in 1844 by Massachusetts to South Carolina as a commis-

sioner to test the constitutionality of the act of that state under which free colored citizens of northern states were imprisoned and sometimes sold. The son graduated at Harvard college in 1835, studied law in Cambridge, and was admitted to the bar in 1840. He was appointed judge of the court of common pleas in 1849, but resigned in 1855 and resumed practice in Boston. In 1859 he was appointed a judge of the supreme court of Massachusetts, and retained this office till 1869, when he was appointed by President Grant attorney general of the United States. He held this office only one year, but during that time reorganized it, by authority of congress, as a distinct department of the government, under the title of the department of justice. In 1870 he was nominated a justice of the supreme court of the United States, but was not confirmed by the senate. He was a member of the joint high commission which negotiated the treaty of Washington in 1871. In 1872 he was elected representative in congress from the seventh district of Massachusetts. In the spring of 1874 he was an unsuccessful candidate before the legislature of Massachusetts for the seat in the United States senate vacated by the death of Charles Sumner.

HOARE, Sir Richard Colt, an English topographer and antiquary, born at Stourhead, Dec. 9, 1758, died May 19, 1838. He inherited great wealth, and devoted himself to art and literature. He made two extensive tours on the continent, returning from the second in 1791, during which he had made numerous valuable drawings, and published accounts of his travels in Elba (4to, 1814) and Italy (4to, and 2 vols. 8vo, 1819). He then travelled in Wales and Ireland, of which he also published descriptions. But his greatest work was a history of Wiltshire, ancient and modern, published in parts and forming 8 vols. folio with plates and maps (London, 1810-'19 and 1822-'52), which however he did not finish. All his works were richly illustrated, and he printed many in small numbers for private circulation.

HOARE. I. William, an English painter, born about 1707, died in Bath in 1792. He painted portraits of Pitt, Grenville, Lord Chesterfield, the duke of Newcastle, &c., and several altarpieces for churches in England. He was one of the original members of the royal academy.

II. Prince, an English artist and author, eldest son of the preceding, born in Bath in 1754, died in Brighton in 1834. He studied in the royal academy and under Raphael Mengs at Rome. In 1799 he succeeded Boswell as foreign secretary to the royal academy. He wrote "Such Things Were," a tragedy, performed in 1788; "No Song, No Supper," a comic opera (1790); "The Cave of Trophobius" (1791); "Dido, Queen of Carthage" (1792); "The Prize" (1793); "My Grandmother" (1793); "The Three and the Dence" (1795); "Lock and Key" (1796); "Mahmoud" (1796); "Julia" (1796); "A Friend

in Need" (1797); "Chains of the Heart" (1802); "Partners" (1805); "Something to Do" (1808); and "An Inquiry into the Requisite Cultivation and Present State of the Arts of Design in England" (1806).

HOBART, John Henry, an American bishop, born in Philadelphia, Sept. 14, 1775, died in Auburn, N. Y., Sept. 10, 1830. He graduated at Princeton college in 1793, and entered a counting house, which he soon left to prepare for the ministry. He became a tutor at Princeton in 1796, and at the same time began there the study of theology, which he completed in Philadelphia, where he was admitted to deacon's orders in June, 1798, and took charge of two suburban parishes. He was pastor, for short periods, of churches in New Brunswick, N. J., and Hempstead, L. I., and in September, 1800, became assistant minister of Trinity church, New York, being ordained priest in 1801. He had already been secretary of the house of bishops, and was elected secretary of the convention of New York, deputy to the general conventions of 1801, '4, and '8, and was on the last two occasions secretary to the house of clerical and lay deputies. He was elected assistant bishop of New York in February, 1811. In 1812 he became assistant rector of Trinity church, and in 1816 was made bishop of the diocese and rector of the church. He was one of the founders of the general theological seminary of the Protestant Episcopal church in New York, in which in 1821 he became professor of pastoral theology and pulpit eloquence. In 1823, on account of failing health, he visited Europe, where he made an especial study of the social, moral, and religious condition of the people. Finding that in England he was accused of insisting upon external forms, to the neglect of essentials in religion, he published two volumes of his sermons (London, 1824) to disprove it. He was rigid in denying the validity of any but Episcopal orders, and opposed the formation of the American Bible and tract societies, as well as every other such organization including Christians of different denominations. Among his works are: "Apology for Apostolic Order" (1807), "The State of the Departed" (1816; new ed., 1846), several devotional manuals, an edition of D'Oyley and Mant's "Commentary on the Bible" (2 vols. 4to, 1818-'20), and a volume of sermons (1824). His posthumous works, with a memoir by the Rev. William Berrian, D. D., appeared in 1833 (3 vols. 8vo).

HOBART TOWN, or Hobarton, the capital of the British colony of Tasmania, on the S. side of the island, 20 m. from the sea, at the head of a fine land-locked harbor called Sullivan cove; lat. 42° 53' S., lon. 147° 21' E.; pop. in 1871, 19,092. The river Derwent flows into the head of the bay, and the town is delightfully situated at its mouth. The bulk of the imports and exports of the colony come to this port. Hobarton and all the other ports of Tasmania are free to foreign whaling vessels.

The city is the seat of an Anglican and a Catholic bishop, has two cathedrals and 21 other churches and chapels, a high school, numerous private seminaries, a mechanics' institute, a magnetic observatory, and a royal society of sciences, which publishes its transactions. The Derwent is navigable by considerable vessels for 3 m. above the town, and by craft of 50 tons for 20 m. higher.

HOBBEMA, or **Hobbima**, **Minderhout**, a Dutch painter, born probably in Coevorden, died in Amsterdam, Dec. 14, 1709. Nothing is known of his personal history, except that he probably lived in Amsterdam, and was on terms of intimacy with Ruysdael, Berghem, and Van der Velde. His subjects are simple landscapes, but the admirable perspective, the fullness and purity of color, and the firmness of execution give to his homeliest scenes a marked and distinctive character. The figures in his pictures were frequently added by Teniers, Ostade, or Van der Velde.

HOBBS, **Thomas**, an English philosopher, born in Malmesbury, Wiltshire, April 5, 1588, died in Derbyshire, Dec. 4, 1679. The son of a clergyman, he was sent at the age of 15 to Magdalen hall, Oxford, where for five years he applied himself to logic and the Aristotelian philosophy. He afterward became private tutor in the family of Lord Hardwicke (soon created earl of Devonshire), and travelled in France and Italy with his pupil, Lord Cavendish. On his return to England he was intimately associated with Lord Herbert of Cheshire, Ben Jonson, and Lord Bacon. Ben Jonson revised for him his first publication, the translation of Thucydides (London, 1628). Severely afflicted by the death both of his patron and pupil, he again visited France and Italy with a son of Sir Gervase Clifton, but returned to England in 1631 at the solicitation of the countess dowager of Devonshire to undertake the education of the young earl. With his new pupil he went abroad again in 1634, and during an absence of three years enjoyed the friendship of Father Mersenne, Gassendi, and Galileo. He withdrew again from England in 1640 at the approach of the civil war, and resided for more than ten years in Paris, where he became acquainted with Descartes. In 1642 a few copies of his *Elementa Philosophica de Cive* were printed at Paris and distributed among his friends, and the work was published by the Elzevirs at Amsterdam in 1647. In that year he was appointed mathematical tutor to the prince of Wales, afterward Charles II., then resident in Paris. In 1650 his treatises on "Human Nature" and *De Corpore Politico* appeared in London, and in 1651 "Leviathan, or the Matter, Form, and Power of a Commonwealth, Ecclesiastical and Civil." The last contains the complete system of his philosophy, treating the same subjects often in the same language as his three previous works. After its publication he returned to England, and wrote a "Letter

on Liberty and Necessity" (1654), which involved him in a long controversy with Bishops Bramhall and Laney. He carried on also for 20 years a controversy with Dr. Wallis, professor of geometry at Oxford, which gained him little honor among mathematicians; his claim was that he had discovered the quadrature of the circle. His opinions were during this period assailed by all classes of religionists and by many eminent writers; and in 1666 his "Leviathan" and *De Cive* were censured by parliament. Yet he was personally esteemed by his former pupil the king, who granted him a pension of £100 from the privy purse, though, yielding to the persuasions of divines, he forbade the philosopher his presence. His fame, too, was spread throughout Europe; foreign ambassadors were interested to see him; and Cosmo de' Medici, prince of Tuscany, visited him and solicited his portrait and a collection of his works to take to Florence. He passed the latter years of his life at the earl of Devonshire's seat in Derbyshire, and continued to write at an advanced age. His principal later publications are an English version of the *Iliad* and *Odyssey* (1675-7), of which three editions were called for in less than ten years, though Pope characterizes it as "too mean for criticism;" the "Decameron Physiologicum, or Ten Dialogues on Natural Philosophy" (1678); an autobiography in Latin verse (1679, translated by himself into English verse), and "Behemoth, or the History of the Civil Wars of England, from 1640 to 1660," published posthumously (1679). He possessed remarkable independence and disinterestedness of character. The earl of Devonshire entertained him in ease, leaving him free to follow his own tastes, and was wont to speak of him as a humorist whom nobody could account for.—The speculations of Hobbes base all knowledge upon sensation; and, as the senses perceive only what is material, matter is the only reality. The mind is physical, and all thoughts result from the pressure of material objects upon it. Sensation consists in the movement of particles of matter, which gradually ceases after the actual period of impact, and the vividness of the conception gradually diminishes. This "decaying sense" is imagination, but, if viewed as a lingering image of the past, it is memory. Knowledge is of two kinds: first, "knowledge original," derived from direct impressions of external things by sensation; second, remembrance of the former, or knowledge of words or of the truth of propositions. He lays immense stress on language; understanding is only the faculty of perceiving the relation between words and things; and errors in reasoning arise only from defective definitions and the wrong employment of names. Yet Hobbes wrote the weighty aphorism: "Words are wise men's counters; they do but reckon by them; but they are the money of fools." His ethics follow necessarily from his metaphysics. Good and

evil have no absolute character, but mean simply personal pleasure or pain, and the highest motives of life must be to attain the one and avoid the other. Moreover, as man does not determine for himself the conditions of pleasure and pain, he is absolutely subject to circumstances and the creature of necessity. Hence results the political theory of Hobbes. Nature gives to every man the right to seek his own happiness, the highest end of being, at whatever expense to his fellow men. The state of nature, therefore, is a state of warfare among men, each seeking to advance only his own interests, and being therefore in hostile collision with every other. Experience, however, proves a state of universal warfare to be one of universal suffering, and reason therefore dictates the institution of government and other social institutions to be the antagonist of man's natural selfishness. The state should be sufficiently mighty to coerce the will of the individual, and its perfect form is an absolute monarchy, to which should be given supreme control over everything connected with law, morals, and religion. In respect of style Hobbes is one of the best English authors. The most complete edition of his English and Latin works is that prepared by Sir William Molesworth (16 vols., London, 1839-'45).

HOBBY, a falcon of the genus *hypotriorchis* (Boie). This genus differs from *falco* (Linn.)



Hobby (*Hypotriorchis subbuteo*).

in having longer and more slender tarsi, covered in front with large hexagonal scales, and very long and slender toes. The species of this genus, to which the American pigeon hawk (*H. columbarius*, Linn.) belongs, prefer wooded and cultivated places, and are generally migratory; they fly with great rapidity and for a long time, pursuing the swift migratory birds. The common hobby (*H. subbuteo*, Linn.) resembles the peregrine falcon in appearance, but is smaller, being only 12 in. long, with an expanse of wings of 26 in., the female being 2 in. longer and wider.

HOBHOUSE, John Cam, Lord Broughton, an English author, born June 27, 1786, died in London, June 3, 1869. At the university of Cambridge, where he graduated in 1808, he contracted an intimacy with Lord Byron, with whom in 1809 he travelled over southern Europe, and subsequently in Switzerland and Italy. After his return to England appeared his "Journey through Albania and other Provinces of Turkey with Lord Byron" (4to, 1812), which was highly commended; and in 1818 "Illustrations of the Fourth Canto of Childe Harold." In 1819, in consequence of the publication of a pamphlet which contained a severe attack on the house of commons, he was imprisoned in Newgate on a charge of having committed a breach of privilege; but the electors of Westminster returned him to parliament after a memorable contest. In 1831 he entered the cabinet of Earl Grey as secretary at war. In 1833 he was made secretary of state for Ireland, and he was president of the board of control from 1835 to 1841, and from 1846 to 1852. He was raised to the peerage as Baron Broughton of Broughton Gifford in Wiltshire, Feb. 26, 1851. His "Italy" was published in 1859. He was one of the originators of the "Westminster Review."

HOBOKEN, a city of Hudson co., New Jersey, on the Hudson river, opposite New York, with which it is connected by two steam ferries, and at the terminus of the Morris and Essex division of the Delaware, Lackawanna, and Western railroad; pop. in 1850, 2,668; in 1860, 9,662; in 1870, 20,297, of whom 10,334 were foreigners. It joins Jersey City on the south, with which and with the adjoining places it is connected by horse cars, and extends about 1½ m. N. and S., and 1 m. E. and W. It is regularly laid out, a portion of the streets running nearly parallel with the river, and the others crossing them at right angles, and is for the most part compactly built. There are three public squares, viz.: Hudson square, near the river; the "Public" square, near the centre of the city; and a smaller one in the S. part. The river frontage is only about ¼ m., the N. portion of the city being separated from the Hudson by a narrow strip of land which was set off to Weehawken in 1859. At the S. end of this strip is Castle point, commanding a fine view of the river and New York harbor, and containing the Stevens mansion and grounds; and N. of the point are the "Elysian Fields," formerly a favorite place of resort for New Yorkers, but now mostly sold for business purposes. From just below the point to a short distance above a walk has been constructed along the margin of the Hudson, which forms a magnificent promenade. The river front is lined with wharves, and here are two United States bonded warehouses, and the termini of four lines of steamers to Europe, viz.: to Bremen, to Hamburg (two), and to Stettin. Hoboken is included in the New York customs district. The residents

chiefly do business or are employed in New York, and the local industry is not large. The city, however, contains the extensive works of the American lead pencil company, a large machine shop (manufacturing steam engines, &c.), the Hoboken iron works (foundry products), the machine shops of the Camden and Amboy railroad company, a national bank with a capital of \$110,000, a fire insurance company with \$100,000 capital, and a savings bank. It is divided into four wards, and is governed by a mayor and a common council of 12 members. The streets are paved and lighted with gas. Water is supplied from the Passaic river by the Jersey City water works, but it is proposed to erect separate works and supply the city from the Hackensack. The assessed value of property in 1873 (about 60 per cent. of the true value) was \$13,135,400; taxation, \$270,043 23, of which \$116,675 23 was for state and county purposes; debt, \$380,000; value of property belonging to the city, \$500,000. The Stevens battery occupies a block near the river. (See IRON-CLAD SHIPS.) The principal charitable institutions of Hoboken are St. Mary's hospital (Roman Catholic) and the widows' home. The Stevens institute of technology is a large stone building, three stories high with a basement, and the grounds comprise a square immediately N. of Hudson square. It was founded by E. A. Stevens, who bequeathed the site, besides \$150,000 for the building and \$500,000 as an endowment. It was opened in 1871, and in 1873-'4 had 8 professors, 61 students, and a library of 5,000 volumes. It has extensive collections of apparatus in the various departments of physics, in engineering, and in chemistry, and cabinets of minerals, &c. The course is four years. The Stevens high school (preparatory department of the institute) in 1873-'4 had 6 instructors, of whom 2 were professors in the institute, and 36 pupils. The Martha institute, an elementary and classical school with a kindergarten department, occupies a fine brick building, and in 1874 had 8 instructors and 200 pupils. There are three large brick public school houses. The schools comprise primary and grammar grades, and in 1874 had 27 teachers and about 3,000 pupils. Evening schools are opened in the winter. There are also an academy, a female seminary, a Catholic school, four weekly newspapers (two German), and 11 churches. —Hoboken was settled by the Dutch in the early part of the 17th century, and named from a village on the Scheldt a few miles S. of Antwerp. It became a city in 1855.

HOCHÉ, Lazare, a French soldier, born at Montreuil, a suburb of Versailles, June 25, 1768, died Sept. 18, 1797. He was the son of a poor workman, enlisted in the army at the age of 16, and on the breaking out of the revolution was sergeant in the regiment of *gardes françaises*. Being promoted to the rank of lieutenant in 1792, he distinguished himself at the siege of Thionville and in the battle of Neer-

winden. After the defection of Dumouriez he was charged with want of patriotism, and arrested; but a plan of a campaign which he was devising being sent to the committee of public safety, Carnot not only liberated him from arrest, but at once promoted him to the rank of brigadier general. He defended Dunkirk against the duke of York, and received the chief command of the army on the Moselle. He was not successful in his first encounters with the duke of Brunswick, and consequently joined Pichegru, who was at the head of the army on the Rhine; he now defeated the Austrians at Weissenburg, and after taking Gernersheim, Spire, and Worms, forced them to evacuate Alsace in 1793. He was suspected by Marat, who caused him to be arrested and brought to Paris; but on the revolution of the 9th Thermidor he was placed in command of one of the three armies which were to suppress royalist insurrections, routed the Vendéans, and in July, 1795, defeated the royalists, who had landed on the peninsula of Quiberon, with the assistance of an English squadron. The committee of public safety then gave him the entire control of the troops along the Atlantic coast. He now forced or persuaded the Vendéans into submission, pursued their chiefs with unrelenting activity, took Charette and Stofflet prisoners, and put an end to the civil war. On Dec. 16, 1796, he sailed from Brest with a fleet carrying 18,000 soldiers, to invade Ireland; but stormy weather scattered his ships. On his return he received the command of the army of the Sambre and Meuse, and made preparations for a great campaign. He crossed the Rhine April 18, 1797, defeated the Austrians in three battles, and reached Wetzlar before learning of the armistice of Leoben. He now resumed his plans for the invasion of Ireland, and meanwhile aided the revolution of the 18th Fructidor with a part of his troops and with 30,000 francs belonging to his wife; and upon its success the army lately under Moreau was added to his own. With these united forces, which assumed the name of the "army of Germany," he might have accomplished his vast schemes, but he died suddenly. A post-mortem examination showed that he had been poisoned, but by whom or for what object has never been ascertained. His death was celebrated by a great funeral solemnity in the Champ de Mars, and a statue of him was erected on the spot where he crossed the Rhine. His name was given to a square in Versailles, which contains a bronze statue of him erected in 1832. A life of Hoche, edited from original documents by Du Chatellier, was published at Paris in 1872.

HOCHELAGA, a county of Quebec, Canada, occupying the E. portion of Montreal island; area, 76 sq. m.; pop. in 1871, 25,640, of whom 20,224 were of French origin or descent. The surface is level, and the soil fertile and well cultivated. Capital, Longue Pointe.

HOCHHEIM. See GERMANY, WINES OF.

HOCHKIRCH, a village of Saxony, 7 m. E. S. E. of Bautzen, memorable for a battle between Frederick the Great and the Austrian general Daun, Oct. 14, 1758. The Prussians, whom the king, contrary to the advice of his officers, had ordered to encamp in an exposed position on an open plain, were attacked before it was light, and under cover of a thick fog, and in the confusion and darkness suffered a terrible defeat, losing all their camp equipage and baggage. When day broke Frederick found himself nearly surrounded by the Austrians, and ordered a retreat. His loss was 9,000 men, including several of his best generals, and more than 100 guns. On May 21, 1813, the allies were defeated here by the French under Marmont and Macdonald.

HÖCHST, a town of Prussia, in the province of Hesse-Nassau, near the Taunus mountains, on the railway from Frankfort to Mentz, $5\frac{1}{2}$ m. W. of Frankfort; pop. in 1871, 3,108. In the thirty years' war Tilly achieved a brilliant victory there, June 10, 1622, over the duke Christian of Brunswick. It was taken six times during that war; and the old castle, where the archbishops of Mentz used to reside occasionally, was then converted into a ruin. On Oct. 11, 1795, the French under Jourdan were defeated there by the Austrians.

HÖCHSTÄDT, a town of Bavaria, in the circle of Swabia and Neuburg, near the Danube, 4 m. N. E. of Dillingen; pop. in 1871, 2,288. In the vicinity was fought in 1704 the celebrated battle of Blenheim, between the English and Austrians and the French and Bavarians, which in Germany and France is known as the battle of Höchstädt. (See **BLENHIM**.)

HOCK. See **GERMANY**, WINES OF.

HOCKING, a S. E. county of Ohio, drained by the river of the same name; area, 380 sq. m.; pop. in 1870, 17,925. It has a hilly surface with several considerable elevations, and is generally fertile. Coal and iron are found. It is traversed by the Columbus and Hocking Valley railroad and the Hocking canal. The chief productions in 1870 were 132,714 bushels of wheat, 498,660 of Indian corn, 108,726 of oats, 54,432 of potatoes, 82,010 lbs. of tobacco, 130,960 of wool, 387,395 of butter, and 13,792 tons of hay. There were 5,062 horses, 4,903 milch cows, 7,897 other cattle, 36,361 sheep, and 15,924 swine; 3 flour mills, 9 saw mills, 3 tanneries, 2 currying establishments, 3 manufactories of furniture, 1 of pig iron, and 1 of woolen goods. Capital, Logan.

HOCKING, or **Hockhocking**, a river of Ohio, rising in Fairfield co., near the centre of the state. It flows S. E. through a picturesque hilly country, and after a course of about 80 m. joins the Ohio at the S. E. extremity of Athens co. About 7 m. from Lancaster in Fairfield co. it has a perpendicular fall of 40 feet. It is deep enough for boat navigation for a distance of nearly 70 m., but is obstructed by falls and dams. The Hocking canal passes along its banks, and connects with the Ohio canal.

HODEIDA, or **El-Hudaidah**, a seaport of Arabia, in Yemen, situated on the Red sea, about 100 m. N. N. W. of Mocha. It is a well built town, having a number of mosques and a good market. Its harbor, which is shallow, is sheltered on the north, but exposed to the S. wind. It is frequently visited by the pilgrim ships from India, which, unable to beat up against the wind, transfer their passengers here to the lighter native vessels, five or six of which, of from 30 to 250 tons each, are built here annually of Malabar teak. A large part of the coffee raised in the district N. of Sana, which was formerly shipped from Mocha, is now sent to Hodeida for exportation. Hodeida is now the seat of the Turkish government of Yemen and of a pashalic under Jiddah, and a considerable garrison is stationed there.

HODGE. **I. Charles**, an American theologian, born in Philadelphia, Dec. 23, 1797. He graduated at Princeton college in 1815, and at the theological seminary in 1819, and became assistant professor in that institution in 1820, and full professor of oriental and Biblical literature in 1822. In 1840 he was made professor of didactic and exegetical theology, to which in 1852 polemic theology was added, which professorship he still holds (1874). In 1825 he founded the "Biblical Repertory and Princeton Review," enlarging its plan in 1829, and remained its editor until it was changed into the "Presbyterian Quarterly and Princeton Review" in 1872. In 1846 he was moderator of the general assembly of the Presbyterian church (old school), and in 1858 one of a committee to revise the "Book of Discipline." The semi-centennial anniversary of his professorship was celebrated at Princeton, April 24, 1872, by a gathering of between 400 and 500 classmates and former pupils. A record of the celebration was published in a volume. Among the works of Dr. Hodge are a "Commentary on the Epistle to the Romans" (Philadelphia, 1835; abridged, 1836; rewritten and enlarged, 1866); "Constitutional History of the Presbyterian Church in the United States" (2 vols., 1840-'41); "The Way of Life" (1842); commentaries on Ephesians (1856), 1st Corinthians (1857), and 2d Corinthians (1860); "Systematic Theology" (3 vols., 1871-'2); and "What is Darwinism?" (1874). Selections from his contributions to the "Princeton Review" have been reprinted in the "Princeton Theological Essays" (2 vols., 1846-'7), and in his "Essays and Reviews" (1857). **II. Archibald Alexander**, an American clergyman, son of the preceding, born at Princeton, N. J., July 18, 1823. He graduated there in 1841, was tutor in the college from 1844 to 1846, graduated at the Princeton theological seminary in 1847, and went as a missionary of the Presbyterian board to Allahabad, returning in 1850. He became pastor at Nottingham, Cecil co., Md., in 1851, at Fredricksburg, Va., in 1855, at Wilkesbarre, Pa., in 1861, and at Allegheny City in 1866. In 1864 he was appointed professor of didactic,

historical, and polemic theology in the Western theological seminary in Allegheny City. He has published "Outlines of Theology" (New York, 1860; translated into Welsh, 1863); "The Atonement" (1867); "Commentary on the Confession of Faith" (1869); and "Presbyterian Doctrine briefly stated" (1869).

HODGEMAN, a S. W. county of Kansas, drained by the Pawnee fork of Arkansas river; area, 900 sq. m.; still unsettled.

HODGES, William, an English painter, born in London about 1744, died March 6, 1797. After gaining some repute as a painter of landscapes, theatrical decorations, and architectural views, he accompanied Capt. Cook on his second voyage to the South seas, furnishing the illustrations for his narrative. He subsequently went to India under the patronage of Warren Hastings, and amassed a fortune, which he lost in an attempt to establish a bank. He published an account of his travels in India, with plates.

HODGKINSON, Eaton, an English physicist, born at Anderton, near Northwich, in Cheshire, Feb. 26, 1789, died at Broughton, near Manchester, June 18, 1861. He was intended for the church, but, possessing a great taste for mechanics, soon determined to make it his exclusive study. Among the first fruits of his researches was the discovery that by giving to cast-iron rails and beams the form of an inverted T (⌢) a gain of strength equivalent to upward of 40 per cent. would be secured. Continuing his investigations on the properties of iron, he instituted a series of 227 experiments with reference to the strength of columns, from which he deduced formulas for solid and hollow iron columns, which have been generally adopted and formed into tables for ready reference. His published account of these researches procured him the gold medal and the membership of the royal society. In 1845 he was employed by Robert Stephenson to prepare the data for the construction of the celebrated tubular Britannia bridge, and for these calculations received a medal at Paris in 1855. In 1847 he was appointed on the royal commission to inquire into the application of iron to railway structures, and added to its report memoranda of great value. His papers on the use of iron for engineering and architectural purposes, interspersed through the "Transactions" of the British association and other learned bodies, are of high authority.

HODGSON, John E., an English painter, born in London in 1811. He is the son of a merchant at St. Petersburg, passed the early part of his life in his father's counting house, and subsequently studied at the royal academy in London. He spent some time in Tunis and other parts of the East, and acquired reputation by humorous and genre pictures. Among these are "The Reorganization of the Army of Morocco" and "A Snake Charmer," exhibited in 1872. He was elected an associate of the royal academy in 1873.

HOEVEN, Jan van der, a Dutch naturalist, born in Rotterdam, Feb. 9, 1801, died in Leyden, March 10, 1868. In 1819 he entered the university of Leyden, where he remained till 1822, studying chiefly natural philosophy and medicine. He began the practice of medicine in his native city, but in 1826 was appointed extraordinary and in 1835 ordinary professor of zoölogy at Leyden. His principal work is *Handboek der Dierkunde* (Leyden, 1827-'33), translated into English by the Rev. W. Clark ("Handbook of Zoölogy," 2 vols. 8vo, London, 1856-'8.)

HOFF (formerly Regnitzhof), a town of Bavaria, in the circle of Upper Franconia, on the Saale, near the N. E. boundary of the kingdom, 30 m. N. E. of Baireuth, and 150 m. N. by E. of Munich; pop. in 1871, 16,010. It has considerable manufactories of hosiery, woollen and cotton goods, and leather, and extensive breweries. It has a large transit trade, chiefly by railway. In 1823 it was almost entirely destroyed by fire.

HOFFER, Andreas, a Tyrolese patriot, born Nov. 22, 1767, in a tavern at St. Leonard's in the Passeyr valley, called the Sand house (whence his popular name of the *Sandwirth*, or Sand Landlord), shot at Mantua, Feb. 20, 1810. He was known as a wine dealer and horse drover between Tyrol and the north of Italy. In 1796 he led a company of riflemen against the French on Lake Garda, and in 1803 organized the rural militia. In 1805 he was made a member of the deputation to which was committed the political direction of the country. Shortly after Tyrol was taken from Austria by the treaty of Presburg, and given to Bavaria. In January, 1809, when the disaffection toward Bavaria had become extreme and hostilities were on the point of breaking out between France and Austria, Hofer was one of the secret envoys who went to Vienna to confer with the archduke John on the subject of their national grievances. The archduke advised a rising in Tyrol, and the baron von Hormayr was early in 1809 charged to carry it out. The preparations were skilfully concerted, and in a few days the whole Tyrol was in arms, and 8,000 French and Bavarian troops were taken prisoners at Hall and Innspruck, and in Sterzing, where Hofer commanded. The Tyrolese were supported by 10,000 Austrians, but Bavaria sent 25,000 troops to quell the revolt. While the latter were toiling through narrow valleys, Hofer fell upon them, and on April 10 defeated Bisson and Lemoine in the moors of Sterzing. Within a week the whole province was free, and nearly 10,000 French and Bavarian troops were destroyed. Napoleon now sent into Tyrol three armies, one of which, commanded by Marshal Lefebvre, defeated Chasteler's Austrians at Wörgl, and the Tyrolese at Feuer-Singer. Hofer soon rallied his countrymen, and defeated the Bavarians with great loss at Innspruck. But Napoleon's victory at Wagram (July 6, 1809) resulted in a

stipulation that Austria should evacuate Tyrol. Lefebvre marched from Salzburg into Tyrol with over 20,000 French, Saxons, and Bavarians, while Beaumont with 10,000 advanced from Bavaria. It was under these trials that the military genius of Hofer displayed itself most brilliantly. After sustaining several reverses, Lefebvre with 25,000 Bavarian and French soldiers, including 2,000 cavalry, was completely routed (Aug. 13) by 18,000 Tyrolese peasants, and driven from Tyrol. An independent government was formed, with Hofer at its head as absolute ruler. After the peace of Vienna, however, the archduke addressed a proclamation to the Tyrolese urging them to submit, while at the same time three veteran armies marched into the country to force them to obedience. Under these circumstances Hofer sent in his submission in November to Eugène Beaubarnais, the viceroy of Italy, and to the Bavarian commander-in-chief. Deceived by reports of Tyrolese victories and the entrance of the archduke into Tyrol, he took up arms again, but being defeated fled for concealment to the mountains, where the peasants resisted all inducements to reveal his hiding place. He was at last betrayed to Gen. Baraguey d'Hilliers by one of his most trusted partisans for 300 ducats, arrested on the night of Jan. 20, 1810, and taken to Mantua. He was tried before Gen. Bisson. A majority of the judges wished to save his life, but Napoleon gave orders that he should be put to death within 24 hours. He died without the slightest indication of fear, refusing to have his eyes bound, and himself giving the word to fire. His property was confiscated. In 1819 the emperor Francis of Austria conferred upon his family, under the name of Von Passeyr, the patent of nobility already decreed in 1809. This was the name of the place where Hofer was captured, and where a monument was erected to his memory. The house where he was born and lived was converted by the emperor into an asylum for 16 old Tyrolese, while his remains were brought in 1823 from Mantua to Innsbruck, and buried in the cathedral there, near the monument of the emperor Maximilian. A marble statue was placed in 1834 over the tomb.

HOFFMAN, Charles Fenno, an American author, born in New York in 1806. In 1817 his leg was crushed between a steamboat and the wharf and had to be amputated. He was educated at Columbia college, which he left in the junior year, was admitted to the bar at the age of 21, and practised for three years, during which time he became associated with Charles King in the "New York American" newspaper. He was the first editor of the "Knickerbocker Magazine," but resigned the post after the issue of a few numbers. In 1835 he published "A Winter in the West" (2 vols.), recording the experience of a journey made in 1833; and in 1837 "Wild Scenes in the Forest and the Prairie" (2 vols.). His only novel, "Greyslaer," appeared in 1840. In 1842 his

lyrics were published in a volume entitled "The Vigil of Faith, and other Poems," and in 1844 "The Echo, or Borrowed Notes for Home Circulation," a second volume of poetry. "Love's Calendar, and other Poems" (New York, 1848), is a more complete collection of his lyrics. In 1846-'7 he edited the "Literary World." About 1850 he became afflicted with a mental disorder, and has since lived in a lunatic asylum. A new edition of his poems, edited by his nephew, Edward Fenno Hoffman, was published in 1874.

HOFFMAN, David, an American lawyer, born in Baltimore, Dec. 25, 1784, died in New York, Nov. 11, 1854. From 1817 to 1836 he was professor of law in the university of Maryland. Having resigned his professorship, he travelled in Europe for two years, and afterward practised law in Philadelphia till 1847, when he again went to Europe, returning in 1853. During this time he furnished to the London "Times" several papers relating to the government and people of the United States. He published "A Course of Legal Study" (1817; 2d ed., 2 vols. 8vo, 1836), of which Justice Story said, "It contains by far the most perfect system for the study of the law which has ever been offered to the public." His "Legal Outlines," of which only one volume appeared (1836), has also been commended as a text book. He also published "Miscellaneous Essays" (1837), "Viator" (1841), and "Chronicles selected from the Originals of Cartaphilus the Wandering Jew" (2 vols., London, 1855).

HOFFMAN, Murray, an American jurist, born in New York, Sept. 29, 1791. He graduated at Columbia college in 1809, studied law, and practised for a number of years. In March, 1839, he became assistant vice chancellor, which office he held for four years. He was appointed judge of the superior court in New York in November, 1853, and held that office till the end of 1861. Judge Hoffman has published "Office and Duties of Masters in Chancery" (1824); "Treatise on the Practice of the Court of Chancery" (3 vols., 1840-'43); "Treatise on the Corporation of New York as Owners of Property, and Compilation of the Laws relating to the City of New York;" and "Vice Chancery Reports" (1839-'40). As an active layman in the Episcopal church, he has published "Treatise on the Law of the Protestant Episcopal Church in the United States" (1850); "Ecclesiastical Law in the State of New York" (1868); and "The Ritual Law of the Church, with Notes on the Offices, Articles, &c." (1872).

HOFFMAN, Daniel, a German clergyman, born in Halle about 1540, died in Wolfenbüttel in 1611. At first professor of ethics in Jena, he afterward taught theology in Helmstedt, and became well known in the controversies of the reformation, opposing Beza on the encharist. He was censured by an assembly of divines in 1593, and threatened with excommunication, and published in reply a famous apology. In

1598 he asserted that there must always be a contradiction between the truths of theology and those of philosophy. Accused by Martini and Caselius, he was obliged in 1601 to recant; but returning the next year to his original views, he was deprived of his professorship. His followers, on account of their belief in opposing truths, were called Duplicists, their opponents Simplicists.

HOFFMANN, Ernst Theodor Wilhelm (AMADEUS), a German author, born in Königsberg, Jan. 24, 1776, died in Berlin, July 24, 1822. He manifested an early taste for music and drawing, studied law at the university of his native place, graduated in 1795, and in 1796 began practice at Glogau. He was soon afterward appointed referendary to the superior court of Berlin, and in 1800 was named assessor of the province of Posen; but having drawn a number of caricatures containing allusions to the "scandalous chronicle" of the city of Posen, the minister, instead of signing his appointment as councillor, sent him to Plock (1802). Before his departure Hoffmann married a young Polish lady, who shared his exile. While at Plock he wrote much, composed masses and a grand sonata, and copied in pen drawing all the vases of the Hamilton collection. In 1803 he was appointed counsellor of the regency at Warsaw, where his life became a strange mixture of legal duties and theatrical management, his clients visiting him behind the scenes, where he was painting or training musicians. The entry of the French army reducing him to poverty, he wandered to Berlin and Bamberg, and was finally invited by Rochlitz, his future biographer, to write for the newspaper which the latter then edited at Leipsic. His sufferings at this period were great and varied. He lost his daughter, saw his wife shockingly maimed by an accident, and had his system shaken by a nervous fever. But during eight years he was always busy, passing his nights in revels, and his days as editor, leader of an orchestra, translator, designing machinist, fresco painter, or church singer, and finally became, with Holbein, director of the theatre of Bamberg. In 1816 he was appointed counsellor of the court of appeal, and soon became famous for his musical compositions. His means were now abundant, and his eccentricities and dissipations were redoubled. He was sought by the first society, but took refuge in wine cellars among wild companions. To render his dissipation less gross and public, his literary friends formed a club known as the *Serapiensbrüder*, and the results of their meetings were written by Hoffmann in the form of a collection of articles bearing the same name, which contains his best tales (4 vols., Berlin, 1819-'21; with a supplementary volume, 1825). One of his most characteristic books, all of which are marked by an extraordinary exuberance of fancy and replete with grotesque caricature, is *Die Elizire des Teufels* (Berlin, 1816). Toward the

close of his life he was afflicted with a painful disease; but he dictated a number of curious books, among which is *Lebensansichten des Katers Murr*, occasioned by the death of a favorite cat. There is a complete edition of his works in 12 vols. (Berlin, 1857).

HOFFMANN, Friedrich, a German physician, born in Halle, Feb. 19, 1660, died there, Nov. 12, 1742. He graduated at Jena, visited Holland and England, and after his return was appointed physician to Frederick William, elector of Brandenburg. The elector Frederick III., afterward king of Prussia, appointed him in 1693 chief professor of medicine in the university recently founded at Halle. In 1708 he was appointed physician to the king, and removed to Berlin; but in 1712 he returned to his professorship at Halle. He was one of the first to advance medicine from the old mediæval grounds, maintaining that the phenomena of living bodies are not to be explained by the laws of inanimate or inorganic nature, but that they depend on the continued action of life. He tested the action of many medicines, and invented new ones, of which the *elixirum viscerale* and *liquor anodynus* are still in use. He was the discoverer and introducer of Seidlitz waters, and of the salt obtained from them. Among his works which are still of value are *Systema Medicinæ Rationalis* (9 vols., Halle, 1718-'40), *Medicina Consultatoria* (12 vols., 1721-'39), and *Consultationum et Responsorum Medicinalium Centuria* (1734). His life, in Latin, was written by J. H. Schultze, and published at Halle in 1730.

HOFFMANNSEGG, Johann Centurius, count, a German botanist, born in Dresden, May 23, 1766, died there, Dec. 13, 1849. He studied in Leipsic and Göttingen, served as an officer in the Saxon guard from 1783 to 1786, and spent some years in travel. He discovered several hundred new plants, and made important contributions to entomology. He published *Voyage en Portugal* (Paris, 1805), and, with the aid of H. F. Link, *Flore portugaise*, in French and Latin (fol., Berlin, 1809-'33), toward the cost of which he himself contributed nearly \$40,000.

HOFFMANN VON FALLERSLEBEN, August Heinrich, a German poet, born at Fallersleben, Hanover, April 2, 1798, died at the palace of Korvei, near Hörter, Jan. 21, 1874. He intended to study theology, but the brothers Grimm directed his attention to German philology and literature, to which he zealously devoted himself. He was keeper of the university library at Breslau from 1823 to 1838, and professor of the German language and literature from 1830 to 1842, when he was suspended for political reasons, and for one year was not allowed to live in Prussia. In 1854 he settled at Weimar, and in 1860 became librarian of the duke of Ratibor and prince of Korvei. The latter part of his life was devoted to the publication of his autobiography (*Mein Leben*, 6 vols., 1862-'68). His works, archæological, historical, poetical,

and miscellaneous, are numerous, and his popular songs acquired great celebrity, chiefly from their witty and liberal character.

HOFHUF, a city of Hasa, Arabia, near the Persian gulf, in lat. 25° 20' 56" N., lon. 49° 40' 50" E.; pop. about 24,000. It was once strongly fortified, but its walls and towers are now little more than heaps of ruins. It is divided into three quarters or districts, which meet in a public square 300 yards in length by 75 in breadth. The *Kot*, the quarter in which resides the governor and his officials, is a vast citadel, surrounded by a deep trench, with massive walls and towers built of earth and stone. The great mosque is a building in the Moorish style, with arches and light porticos. Small enclosed gardens are attached to many of the houses, and fig and citron trees overhang the streets, but most of the orchards and plantations are without the walls. A general fair is held every Thursday, and one is held on Mondays at Mebarraz, a town of 20,000 inhabitants, 8 m. N. of Hofhuf.

HOFLAND, Barbara, an English authoress, born in Sheffield in 1770, died Nov. 9, 1844. She was the daughter of Robert Wreaks, a manufacturer in Sheffield, and in 1796 married Mr. Hoole, who died about two years later, leaving her poor. She published a volume of poems in 1805, and with the proceeds established a small school at Harrogate. In 1808 she married Thomas C. Hofland the artist. In 1812 she published five different works, and from that time was almost constantly busy with her pen, producing in all about 70 works, of which the sale was very large both in Europe and America. Most of them were novels and moral tales for the young. Among the most popular were "The Daughter-in-Law," "Emily," "The Czarina," "The Clergyman's Widow," "Says She to 'her Neighbor, What?" and especially "The Son of a Genius."

HÖFLEB, Karl Adolph Konstantin, a German historian, born at Memmingen, Bavaria, March 26, 1811. He graduated at Munich in 1838, and continued his studies at Göttingen and in Italy. In 1836 he became editor of the official government organ in Munich, and in 1838 adjunct, and about 1840 full professor at the university. In 1847 he was removed from his professorship in consequence of the publication of *Der Constitution seid der Katholiken in Baiern*, but was soon after appointed keeper of the archives in Bamberg. In 1851 he was made professor of history in Prague. His works include *Die deutschen Päpste* (2 vols., Ratisbon, 1839); *Quellensammlung für fränkische Geschichte* (4 vols., Baireuth, 1849-'52); *Fränkische Studien* (6 parts, Vienna, 1852-'3); *Lehrbuch der allgemeinen Geschichte* (3 vols., Ratisbon, 1850-'56; 1 vol., Vienna, 1857); and *Die Geschichtschreiber der Habsburgischen Bewegung* (2 vols., Vienna, 1856-'65).

HOFMANN, August Wilhelm, a German chemist, born in Giessen, April 8, 1818. He is the son of an architect, and studied chemistry under

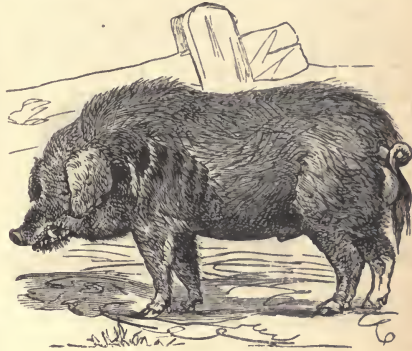
Liebig, whose assistant he was at the university of Giessen. In 1845, after having been appointed professor at Bonn, he was at Liebig's recommendation placed in charge of the newly established royal college of chemistry in London, which was united in 1853 to the royal school of mines; and in 1855 he received the additional appointment of chemist to the mint. His reputation as one of the most successful teachers of chemistry of the present day brought him many offers from German governments, and in 1865 he succeeded Mitscherlich in the university of Berlin. Faraday's discovery of benzole among the oily products found in compressed oil-gas holders early attracted Hofmann's attention, and his important researches resulted in 1845 in his discovering the presence of the same substance in coal-tar oil. He indicated by formulas the successive changes in the transformation of benzole into nitro-benzole, and of the latter into aniline; and it is to him that science is indebted for most of the discoveries which have been made in these colors. The dye known as fuchsine, azaleine, mauve, solferino, magenta, &c., he showed to be a combination of a base, which he named rosaniline, with an acid, usually acetic or hydrochloric. He has recently investigated the conversion of aniline into toluidine, and is now (1874) investigating processes for the production of homologues of amines of other classes, and of some of the bases occurring in the organization of plants. He has conducted, with Dr. Bence Jones, the later editions of Fowne's "Manual of Chemistry," and contributed many disquisitions on organic chemistry and other subjects to scientific publications in England and Germany. A royal medal was awarded to him in 1854 for his memoirs on the molecular constitution of the organic bases, and he afterward became president of the chemical society. He wrote the report on the chemical department of the great London exhibition of 1862, and that on the tar dyes in the Paris international exhibition of 1867. His other important works relate to hygiene and to chemical technology, and include *Einleitung in die moderne Chemie* (1865; 5th ed., Brunswick, 1871), and essays commemorative of Thomas Graham and of Gustav Magnus in the *Berichte der deutschen chemischen Gesellschaft* (Berlin, 1869-'70).

HOFWYL. See FEILENBURG.

HOG (*sus*, Linn.), a well known pachydermatous animal, found throughout the world, and sufficiently characterized in the article BOAR. Besides the common *sus scrofa* (Linn.), the hogs as a family have been made to include the peccary (*dicotyles*, Cuv.) and wart hog (*phacochoerus*, F. Cuv.); and the name of hog or pig has been erroneously applied to some of the cavies, the armadillo, the porpoise, and other animals with porcine appearance and habits. The dentition is as follows: incisors $\frac{3}{4}$ or $\frac{5}{4}$, canines $\frac{1}{2}$ or $\frac{3}{4}$, and molars $\frac{7}{2}$ or $\frac{4}{2}$, 42 or 44 in all; the lower incisors project forward, and

the canines, even the upper, curve upward. The feet are four-toed, the two anterior or intermediate toes being the largest, and the two lateral or posterior scarcely if at all touching the ground. The utility of the hog as an article of food is in great measure owing to the remarkable fecundity of the animal; it being capable of reproduction at about a year old, and producing from 8 to 12 and even more at a birth twice every year, the supply will always be equal to the demand. Vanban has estimated the product of a single sow, with only six young at a time, in 10 generations to be about 6,500,000, of which 500,000 may be deducted on account of accidental death. The hog was highly esteemed by the ancients, and was the animal sacrificed to Ceres, the goddess of the harvest. In hot climates, as in Egypt, pork is not considered wholesome, and accordingly the ancient legislators and priests of that country for sanitary reasons forbade its consumption; the Hebrew and Moslem lawgivers also prohibited it, and these sects abstain from its flesh even in cold climates, where it might be used with safety. The filthy habits of the hog are in great measure due to its domestication; the wild hog is cleanly, and selects its food chiefly from vegetable substances. The hog has the propensity to wallow in the mire common to all pachyderms, and generally for the purpose of ridding itself of vermin, or of protecting its thinly covered skin from the attacks of insects; the wild boar in this respect is no more dirty than the elephant, the rhinoceros, and the hippopotamus.—The hog occupies so prominent a place in domestic economy, commerce, and the arts, that it may be well to mention those generally considered the best varieties. If this animal, whose flesh,

particular object of the farmer. The Chinese hogs, both the white and black varieties, are easily fattened, and have small bones; indeed they are generally too fat to be esteemed as pork, and are considered to make poor bacon; bred carefully, and mixed with other stocks,

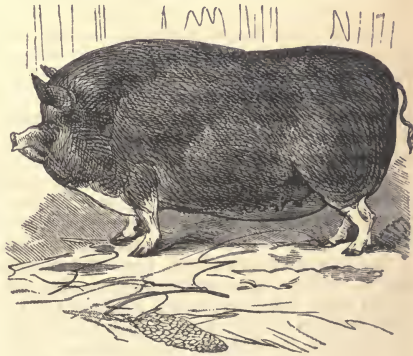


Original Old English Hog.

they are valuable animals. The Neapolitan is the most celebrated of the Italian breeds, and the stock of most of the English breeds; though not very hardy, the flesh is of superior quality; it is small, black, with few bristles, short snout, erect ears, and small bones; crossed with the Berkshire breed, the form is improved and the constitution hardened, with a remarkable tendency to fatten easily. The Berkshire, an English breed, black or white, is larger than the Neapolitan, with more bristles, and less fat to the meat, which is well suited for bacon and hams; this was formerly preferred above all others in many parts of New



Chinese Hog.

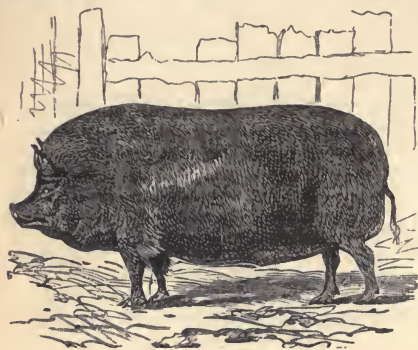


Improved Berkshire Hog.

fat, hair, and bones are so valuable, can be improved even to the amount of \$1 for every animal, an immense sum will be realized to the farmer. Different breeds are prized in different districts, according to the fancy of producers, the facility of raising them, and the

England, but its cross with the Chinese is more profitable, as the weight is heavier with light feeding, and the disposition milder. The Essex, crossed with the Neapolitan, is one of the most valuable, and has taken more prizes in England than any other breed; it is black, of good size

and symmetry, mild disposition, easily fattened, the meat of excellent quality, and the dressed weight at 12 and 18 months 250 to 400 lbs.; it is not subject to cutaneous diseases. The Irish grazer is slow in coming to maturity, but crossed with the Berkshire is an excellent



Improved Essex Hog.

variety. The Woburn or Bedford breed was originally sent by the duke of Bedford to Gen. Washington, and was produced at Woburn, England, by a cross of the Chinese boar and a large English hog; when pure they are white, with dark ash-colored spots; they are of large size, with deep round bodies, short legs, and thin hair, easily kept and maturing early. The Middlesex is a popular breed in England, and has been considerably imported into the United States; it is derived from a mixture of the Chinese with some larger stock; the color is usually white, and the size larger than the Suffolk, weighing at 18 months 800 to 900 lbs.; the bones are smaller than in the Essex. But the favorite of all breeds seems now to be the Suffolk, so named from that county in England, whence the London market has long been supplied; the present breed is believed to have originated from the old Suffolk crossed with the Chinese and Berkshire; the pure breed is remarkably symmetrical, small and compact, short-legged and small-headed, the exact opposite of the long, lank, and lean hogs of the western prairies; their early maturity, small consumption of food, and tendency to fat compensate for their want of size; the color is white. These are the most esteemed varieties; there are many others, imported and domestic, which thrive well in peculiar districts. While hogs are kept in New England and the middle states mostly in pens, in the west they are allowed to range in the woods and fields till within three months of the time of killing them, feeding upon clover, corn, acorns, and mast.—No animal displays the changes arising from domestication more than the hog, as may be seen by contrasting the large, savage, long-legged wild boar, leading dogs and horses a weary chase, with the small, docile, plump, short-legged Suffolk, with difficulty getting

from one side of his pen to the other. It is not probable that all the varieties of the hog are derived from the wild boar of Europe and Asia; the Polynesian species, the African, and perhaps the babyroussa, have become crossed with introduced breeds, causing the same variety and confusion observed in all domesticated animals. The hog is not a stupid animal; like other pachyderms it is susceptible of education, and the stories of learned pigs and hunting hogs do no discredit to the order which contains the elephant.—Several species of fossil hogs, of the genus *sus*, are found in the tertiary and diluvial deposits of central Europe; the fossil hogs seem to have been, like the present animal, charged with fat; the teeth are the portions generally met with, as the bones from their spongy character would soon decay. Allied species are also found in the same formations in India.—According to the census of 1870, the total number of swine on farms in the United States was 25,134,569. The states containing the most were Illinois, which had 2,703,343; Missouri, 2,306,430; Iowa, 1,872,230; Kentucky, 1,838,227; Tennessee, 1,828,690; and Ohio, 1,728,968. In many of the western states the slaughtering of hogs and the packing of pork form an important industry. A great majority of the hogs are slaughtered and packed between the 1st of November and the 1st of March; but recently summer packing has been found profitable, and now large quantities of pork are packed during that season. The greatest centres for this industry in the United States are Chicago and Cincinnati. Formerly Cincinnati ranked first, but the supremacy is now held by Chicago. The extent of the operations at these two points is indicated by the statement that of the 5,333,810 hogs packed in the southern and western states between Nov. 1, 1873, and March 1, 1874, 1,520,024 were packed in Chicago and 581,253 in Cincinnati. The states ranking highest in the magnitude of this industry are Illinois, in which the number of hogs packed during this period was 1,870,855; Ohio, 897,627; Missouri, 735,868, of which 463,793 were packed in St. Louis; and Indiana, 699,223. The total value of all the hogs packed in the southern and western states during the winter season of 1873-'74 was \$63,370,339; aggregate gross weight, 1,444,311,304 lbs.; average gross weight, 268-27 lbs.; total product of lard, 191,139,000 lbs.

HOGAN, John, an Irish sculptor, born at Tallow, county Waterford, in October, 1800, died in Dublin, March 27, 1858. Originally a lawyer's clerk, he showed so decided a taste for sculpture that at the age of 23 he was enabled by the liberality of some friends to visit Rome for the purpose of study. His "Drunken Faun" was pronounced by Thorwaldsen worthy of an Athenian studio, and he received for it a medal at the exposition in Paris in 1851. His career was passed in Ireland, and his works are chiefly religious and monumental subjects.

HOGARTH, George, a British writer on music, born in Scotland about 1797, died Feb. 12, 1870. In early life he was a writer to the signet in Edinburgh, but went to London as a musical critic and author. In 1836 he published "Musical History, Biography, and Criticism" (enlarged ed., 1838), and in 1839 "Memoirs of the Musical Drama," of which an abridged edition, under the title of "Memoirs of the Opera—Italy, France, Germany, and England," appeared in 1851. He published some other miscellaneous works on music, was for many years musical and dramatic editor of the "Morning Chronicle," and on the establishment of the "London Daily News," edited by his son-in-law, Charles Dickens, became its musical critic. His writings are considered standard authorities on the subjects of which they treat.

HOGARTH, or more properly **Hogart, William**, an English painter, born in London in 1697, or according to some authorities in 1698, died Oct. 26, 1764. His father, who was the son of a Westmoreland yeoman, and by profession a teacher and an occasional corrector of the press, could do little more for him than "put him in the way of shifting for himself." His education was therefore scanty; but his early taste for design was evinced in the number and variety of the ornaments with which his school books were adorned. He was apprenticed to a silversmith, and, in the intervals of his labors in engraving arms and ciphers, gradually acquired a knowledge of drawing from nature. At 20 years of age engraving on copper was his utmost ambition. The first indication of the direction his talents were to take was given in a humorous illustration of a pothouse brawl, of which he was a witness. Upon the expiration of his apprenticeship in 1718 he attended the lectures of Sir James Thornhill, sergeant painter to the king, and drew from the life at the academy in St. Martin's lane, but without attaining any great proficiency. His first employment seems to have been the engraving of shop bills and arms, after which he furnished frontispieces and plates for books, of which his illustrations of "Hudibras" afford a not very felicitous example, as he was always more successful in illustrating his own ideas than those of others. Having meanwhile acquired some facility in painting, he endeavored to find employment in painting portraits, a branch of his art in which he might have attained eminence had he chosen. Thus struggling on, and always contriving, as he tells us, to be "a prompt paymaster," he ventured in 1730 upon a "stolen union" with the daughter of his former master, Sir James Thornhill, which at first proved very unpalatable to the court painter; but when his son-in-law began to gain distinction Sir James became reconciled to the young couple. Shortly after his marriage Hogarth adopted portrait painting as a profession, and also commenced what he called "small conversation pieces," in which the figures were drawn from the life, and often

in humorous attitudes, though not burlesques. From this class of subjects he naturally proceeded to those more earnest scenes of daily life on which his fame rests. In 1734 appeared the six prints of "The Harlot's Progress," designed and engraved by himself, and the artist at once became famous. Upward of 1,200 subscribers entered their names for the series, of which eight piratical imitations almost immediately appeared, to the detriment of the painter, who in 1735 procured the passage of an act of parliament securing to an engraver the copyright of his plates for 14 years. Recognizing by the applause which greeted these works his true path to fortune, he renounced portrait painting, and followed up his success by "The Rake's Progress," "Industry and Idleness," "Marriage à la Mode," "The Four Times of the Day," "The Four Stages of Cruelty," "Beer Lane" and "Gin Lane," and other works, in series or single, which were engraved by himself, and were produced at regular intervals until the close of his life. Appearing at a time when the national efforts in art were few and feeble, they won a popularity which has perhaps increased with time, and to which that of no contemporary artist can be compared. To the last he retained his wonderful powers, and a careful comparison of all his works will show no lack of invention or satiric humor in any of them. Like many men of genius, Hogarth had his foibles, and among them was the impression that historical painting was his true vocation. He railed at the old masters, especially deriding the pretensions of connoisseurs and the popular estimates of the value of old pictures, and undertook to show that no preliminary training was necessary to produce a good historical painting. The result was his "Paul before Felix," "The Pool of Bethesda," and some other works executed at the outset of his career; and "Sigismunda," painted in 1759, in competition with a picture on the same subject by Correggio, and in direct illustration of his principle. The ridicule which the last mentioned picture encountered equalled that bestowed upon his "Analysis of Beauty" (4to, London, 1753), the leading principle of which is that a curved line, in shape somewhat like the letter S, is the foundation of all beauty. But Hogarth preserved his equanimity until his quarrel in 1762 with Wilkes and Churchill, which he seems to have provoked by a print, entitled "The Times," indirectly ridiculing Wilkes and the opponents of the ministry. Wilkes replied in a strain of coarse abuse in the 17th number of the "North Briton," and Churchill in a poetical epistle lashed the painter, and more particularly "Sigismunda," with all his strong powers of satire. Hogarth revenged himself upon his opponents with his pencil, depicting the former simply in his natural ugliness, with a Satanic leer which the demagogue could not but acknowledge was genuine, and the latter as a canonical bear, holding a pot of porter and hugging a post inscribed

with an ascending scale of lies. The controversy affected Hogarth's health and spirits, and probably hastened his death.—It is a striking fact that the six pictures of "Marriage à la Mode" were sold in 1744 for £19 6s., though 50 years afterward they brought £1,381. Modern critics have declared that, with the single exception of color, these works are superior to most of the recent productions of English painters. His life has been written by Allan Cunningham, and by G. A. Sala (London, 1867). Of the various editions of his works, the best is that published by the Boydells (atlas fol., London, 1790), the original plates of which, retouched by Heath and others, have been issued in several subsequent editions. Another edition in atlas folio, containing Hogarth's works reengraved by Thomas Cook, was published in London in 1802, but is far inferior to that of the Boydells. The best 4to edition is that edited by Nichols and Stevens (3 vols., London, 1808-'17), with letterpress illustrations. An edition has been issued in 12mo, in which the plates are reduced in exact facsimile (London, 1874). Several reproductions of the engravings of Hogarth have appeared in Germany, among which are: *Hogarth's sämtliche Kunstwerke in 74 Blättern* (Leipsic, 1841); *Hogarth's Werke in verkleinerten aber vollständigen Copien, 75 Tafeln* (Göttingen, 1850-'53); and *Hogarth's Zeichnungen, mit Erklärung* (Gera, 1856-'58). The "Analysis of Beauty," in which he is said to have been assisted by Dr. Benjamin Hoadley and Dr. Morell, was reprinted in 1810; it has been translated into German, French, and Italian.

HOGG, James, better known as the Ettrick Shepherd, a Scottish author, born in the parish of Ettrick, on the river of that name, in Selkirkshire, Jan. 25, 1772 (according to his own statement, although the parish register records his baptism under date of Dec. 9, 1770), died at Altrive, Nov. 21, 1835. He was descended from a family of shepherds, and his youth and early manhood were devoted to the same occupation. He probably never received a year's schooling, but when he was 24 years old he began to compose verses, and his earliest efforts were seriously impeded by his imperfect penmanship. He soon became known to the shepherds and farmers of the neighborhood as "Jamie the poet," and in 1800 a patriotic song of his entitled "Donald MacDonald" obtained great popularity, although the name of the author was not known. From Whitsunday, 1790, to Whitsunday, 1799, he was in the employ of James Laidlaw of Blackhouse, in Yarrow, who gave him free access to his library; and by the age of 30 Hogg had repaired the defects of his early education by a tolerably full course of reading. In 1801, while on a visit to Edinburgh to sell sheep, he was even tempted to publish a small collection of his songs, under the title of "Scottish Pastorals, Poems, and Songs." Shortly after Sir Walter Scott, while exploring the border counties for

materials for his "Minstrelsy of the Scottish Border," met with Hogg, who furnished him with a number of old ballads; and it was at Scott's instigation that in 1803, to repair his losses in an attempt to start a sheep farm in the Hebrides, he published a second collection of poems entitled "The Mountain Bard." With the proceeds he again attempted farming, was again unsuccessful, and in February, 1810, went to Edinburgh to follow the career of an author. For a year he barely supported himself by editing a weekly paper called "The Spy," and in 1813 published "The Queen's Wake," which at once obtained a great popularity. The duke of Buccleuch presented him with the rent-free life occupancy of the farm of Altrive Lake in the braes of Yarrow, but he rented a much larger farm adjoining, and in a few years was reduced to bankruptcy. He was all this time a frequent contributor to "Blackwood's Magazine," and the broadly drawn character of the "Ettrick Shepherd," which figures so prominently in the *Noctes Ambrosianae*, made his name familiar. In 1831 he went to London to superintend the publication of some of his works, and received extraordinary attentions. He died of dropsy, after a short illness. Among his principal works, in addition to those mentioned, are the poems of "Madoc of the Moor," "The Pilgrims of the Sun," "Queen Hynde," "Jacobite Relics," &c.; in prose, "The Brownie of Bodsbeck," "Winter Evening Tales," "The Three Perils of Woman," "The Three Perils of Man," "The Altrive Tales," &c. His "Anecdotes of Sir Walter Scott" was first published in New York (1834). His collected works, first issued in 11 vols., were published in 1869 in 2 vols. 8vo. A monument has been erected in his memory near St. Mary's Loch. His widow survives (1874), receiving from the literary fund a pension of £100.

HOGSHEAD, an old English measure of capacity, which, not being mentioned in the act 5 George IV. relative to weights and measures, cannot now be considered as having any legal existence. The hogshead of wine was two wine barrels, or 63 old wine gallons, equal to 52½ imperial gallons. The London hogshead of ale was 1½ ale barrel, or 48 ale gallons, equivalent to 48·8184 imperial gallons. The London hogshead of beer was 1½ beer barrel, or 54 beer gallons, equal to 54·92040 imperial gallons. The ale and beer hogshead for the rest of England was 1½ barrel, or 51 gallons, or 51·86927 imperial gallons. All excise measurements are made in gallons, and the term hogshead now signifies only a large cask.

HOGUE, La. See CAPE LA HAGUE.

HOHENLINDEN, a village of Upper Bavaria, 20 m. E. of Munich, memorable for a battle fought Dec. 3, 1800, which resulted in a victory of the French general Moreau over the archduke John of Austria. After the truce of Parsdorf (Nov. 13) Moreau's army was stationed between the rivers Isar and Inn, and

the Austrians on the right bank of the Inn. The archduke believed that the French were retreating, and his plan was to attack them in front, while Klenau should cut off their retreat to Munich, and Hiller intercept them on the road to Augsburg. Moreau was indeed retreating, but he chose to concentrate his army at Hohenlinden, and to wait for the enemy. The Austrian army was divided on Dec. 3 into three columns. The main corps, forming the middle column, advanced in a heavy snow storm through the woods toward Hohenlinden, where they attacked the corps of Grenier and Grouchy, which were reinforced in time to beat them back into the defile of the main road. Confused, and attacked by Richepanse, who was subsequently assisted by Ney, the column lost ground and finally dispersed. The other columns were also forced to retreat, and at 2 o'clock the victory was completely in the hands of the French, who desisted from pursuing the Austrians on account of the condition of the weather, as well as of the roads. The Austrians lost 8,000 men dead and wounded, upward of 10,000 prisoners, and 100 guns. The French announced a loss of only 5,000 men. Negotiations were now renewed, and terminated in the treaty of peace of Lunéville.

HOHENLOHE, the name of a German princely family, claiming its descent from the dukes of Franconia, named from the territory of Hohenlohe, originally a county, afterward a principality, mediatised in 1806, and now belonging partly to Bavaria and partly to Würtemberg. It was early divided into the lines of Hohenlohe-Braunegg and Hohenlohe-Hollock. The former became extinct in the fourth generation, and the latter in 1840 formed the two branches of Hohenlohe-Hohenlohe and Hohenlohe-Speckfeld. This last alone has been perpetuated. Georg, count of Hohenlohe-Speckfeld, who died in 1551, left two sons: 1, Ludwig Casimir, the ancestor of the branch of Hohenlohe-Neuenstein-Oehringen, which became extinct in 1805, as well as of Hohenlohe-Neuenstein-Langenburg, now subdivided into Hohenlohe-Oehringen or Ingelfingen and Hohenlohe-Langenburg; and 2, Eberhard, the ancestor of the branch of Hohenlohe-Waldenburg, divided into Hohenlohe-Bartenstein and Hohenlohe-Schillingsfürst.—Of the descendants of Ludwig Casimir, the best known is **FRIEDRICH LUDWIG**, prince of Hohenlohe-Ingelfingen, a Prussian general (born in 1746, died in 1818). He became a colonel in 1788, and in the war against France distinguished himself as lieutenant general in storming the defensive lines near Weissenburg. In 1794 he gained a brilliant victory at Kaiserslautern; in 1800 became a general of infantry, and in 1804 governor of Franconia and general military inspector of Silesia. After holding subsequently several important commands, he was defeated at Jena, Oct. 14, 1806, capitulated at Prenzlau on Oct. 28, and thenceforward withdrew from public life.—Of the Hohenlohe-Waldenburg-Schillingsfürst branch

the most distinguished are: I. **ALEXANDER LEOPOLD FRANZ EMMERICH**, born at Kupferzell, Würtemberg, Aug. 17, 1794, died in the castle of Vöslau, near Vienna, Nov. 14, 1849. He was ordained priest in 1815, distinguished himself at Stuttgart by his charity during an epidemic, and subsequently at Munich by his preaching. In 1816 he went to Rome, where he is said to have entered the society of "Fathers of the Sacred Heart." In 1824 he became canon of Grosswardein, and was made grand provost in 1829. In 1844 he was appointed bishop of Sardinia *in partibus infidelium*. He is chiefly known for the miraculous cures attributed to his prayers in continental Europe and the British isles; the first person thus reported healed by him being the princess Schwarzenberg, who had been for several years a paralytic. Much discussion was also occasioned in the United States by the sudden cure of Mrs. Ann Mattingly in Washington, D. C., March 10, 1824. The pope had been urged in 1821 to give his sanction to the method employed by Prince Hohenlohe, but declined; nor has any approval of these cures been since obtained in Rome. His works are made up of ascetic and controversial treatises, together with several volumes of sermons. His posthumous works were published by Brunner (Ratisbon, 1851). II. **CHLODWIG KARL VICTOR**, a Bavarian statesman, born March 31, 1819. He was first known as prince of Ratibor and Korvei, and succeeded to his brother's title Feb. 12, 1846. In 1867 he became high chamberlain to the king of Bavaria, and minister of foreign affairs. During his administration he labored to promote German unity, while opposing the Prussian policy, which aimed at absorbing the minor states. He introduced the Prussian military system into Bavaria; but as vice president of the customs parliament, he seemed to favor the formation of a South German confederation. He also endeavored to prevent the meeting of the council of the Vatican, and entered for that purpose into negotiations with other European governments. The Bavarian chambers of 1869 being almost equally divided between the friends and opponents of the clerical party, he advised the king to dissolve them. In the new chambers he advocated a policy adverse to Prussia; but failing to make it prevail, he resigned in 1870. After having taken a conspicuous part in making Bavaria join the new German empire, he became a member of the German Reichstag, and on March 23, 1871, was elected its first vice president. He strenuously supports the policy of Bismarck, particularly in the complications with the holy see. In March, 1874, he was appointed German ambassador in Paris.

HOHENSTAUFEN, the name of a German family of princes, which ruled the German empire, with short interruptions, from 1138 to 1254. The name is derived from a castle on Mount Staufen in Würtemberg, built by Frederick

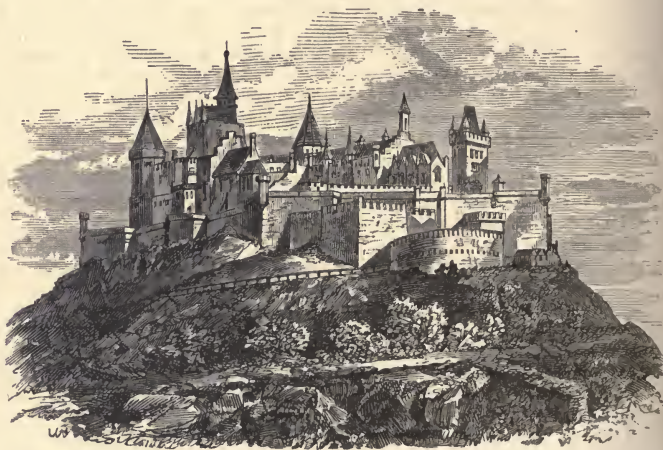
of Büren, one of the ancestors of the family. His son, known as Frederick of Staufen, was a staunch adherent of the emperor Henry IV. during his long struggles with the see of Rome and various rivals in Germany, and after the battle of Merseburg received the hand of his daughter Agnes, and the duchy of Swabia. This sudden elevation of the house, which from another possession in Swabia, Waiblingen, was also called Ghibelline, was the origin of its long struggle with the mighty rival family of the Guelphs. Of Frederick's two sons, Frederick II., the One-eyed, was confirmed by Henry V., the son and successor of Henry IV., in the possession of Swabia, while Conrad received Franconia. After the death of Henry, Conrad and Lothaire of Saxony appeared as competitors for the imperial dignity, and the great power of the Hohenstaufen was the chief cause of the success of Lothaire; but after his death (1137), Conrad, who had waged a long war against the emperor, the pope, and the Guelphs, ascended the throne of Germany as the third of that name.

His nephew Frederick Barbarossa became his successor (1152-'90), and was succeeded by his son Henry VI. (died 1197). The son of the latter, Frederick, a child of two years, was not acknowledged as successor; and his uncle Philip, too, had to struggle against rivals, and was finally slain by Otho of Wittelsbach (1208). But soon after the young Frederick II. (1212-'50) rose in defence of his rights, and waged a gallant struggle against his enemies in Germany, as well as in Italy, where he had inherited from his mother Constance the Norman possessions. His son Conrad IV. died early in Italy (1254), where all the remaining male inheritors of the name of Hohenstaufen soon after perished in their struggle against Rome and the house of Anjou: Manfred, a son of Frederick II., in the battle of Benevento in 1266; Conradin, the young son of Conrad IV., on the scaffold at Naples in 1268; and Enzo, a natural son of Frederick, and the sons of Manfred, in prison. The possessions of the house were divided among various families, and now belong to Baden, Württemberg, and Bavaria. The principal work on the history of the family is Raumer's *Geschichte der Hohenstaufen und ihrer Zeit* (4th ed., 6 vols., Leipzig, 1871).

HOHENZOLLERN, a territory of S. W. Germany, since March 12, 1850, an administrative

division of Prussia, but which previous to that date formed two small independent principalities of the Germanic confederation under the names of Hohenzollern-Hechingen and Hohenzollern-Sigmaringen, Hechingen and Sigmaringen being the capitals. The territory forms a long and narrow strip of land, surrounded by Württemberg, except on the S. W., where it is bounded by Baden; area, about 440 sq. m.; pop. in 1871, 65,558. It is watered by the Neckar and some of its affluents, and by the Danube, which crosses it. Its mountains belong to the Raube Alps. Agriculture, cattle raising, and the manufacture of wooden ware are the chief occupations of the inhabitants. The Roman Catholic is the predominant religion.

HOHENZOLLERN, or **Zollern**, a princely family of Germany to which belongs the royal house of Prussia. The name is derived from the castle of Hohenzollern, in the district of Sigmaringen, on the Zollerberg, a mountain of the Alps, about 2,850 ft. above the sea. Count Thassilo, about 800, is the remotest ancestor named, but



Castle of Hohenzollern.

the family name does not appear before the 11th century. The house was divided in 1226 into two branches. The Frankish branch acquired new possessions in almost every generation. Frederick V. (died 1398) was the first to bear the title of prince, which was given him by the emperor Charles IV. After several divisions the entire estate fell to Frederick VI. (died 1440), who in 1415 received from the emperor Sigismund the electorate of Brandenburg, and called himself as such Frederick I. His 11th successor, Frederick III., became the first king of Prussia as Frederick I. (1701). The Swabian branch failed to gain distinction before the 16th century. Count Eitel Frederick IV. (died 1512) obtained from the emperor Maximilian I. the domain of Haigerloch in exchange for the Swiss county of Râzûns, which he had acquired by marriage. His grandson

Charles I. (died 1576) received from the emperor Charles V. in 1529 the counties of Sigmaringen and Vöhringen. Charles's sons Eitel Frederick VI. and Charles II. divided the estates. The former took Hohenzollern, and adopted for his line the name Hohenzollern-Hechingen; the latter received Sigmaringen and Vöhringen, and assumed the name Hohenzollern-Sigmaringen. The son of Frederick VI., John George, was in 1623 raised by the emperor Ferdinand II. to the dignity of a prince of the empire, which was also conferred in 1638 on the Sigmaringen family. In 1695 and 1707 the Frankish and Swabian branches agreed upon a common law of succession, subsequently ratified by the king of Prussia as the head of the house. The treaty established among them the right of primogeniture, and provided that in case one of the branches should be without a male successor, the estates should be transferred to the other branch; and that in case both branches should become extinct in the male and female lines, the estates should fall to the royal house of Prussia. In consequence of the political troubles of 1848, the princes Frederick William of Hohenzollern-Hechingen and Charles Anthony of Hohenzollern-Sigmaringen resigned the government of their territories, Dec. 7, 1849, and the principalities, according to the treaty, fell to the crown of Prussia, which took possession of them March 12, 1850. The two princes received the rank of younger princes of the royal house.—Prince CHARLES ANTHONY of Hohenzollern-Sigmaringen, born Sept. 7, 1811, presided over the Prussian cabinet from Dec. 2, 1858, to March, 1862. His eldest son, Prince LEOPOLD, born Sept. 22, 1835, married in 1861 the infanta Antonia of Portugal. His paternal grandmother was a princess Murat, and his mother was a niece of the empress Josephine and adopted daughter of Napoleon I. On July 4, 1870, the provisional government of Spain proposed him to the cortes as candidate for the Spanish crown. The French government declared that the occupation of the Spanish throne by a prince of Hohenzollern would be incompatible with the interests of France, and demanded that the king of Prussia should forbid Prince Leopold to accept the crown. The king refused to make such an order, on the ground that he had no right to give orders to a prince of his house who was of age; and although Leopold (July 12) voluntarily declined to be a candidate for the Spanish crown, France was not satisfied, and the result was the Franco-German war of 1870-'71. He is a major general in the Prussian army. His brother CHARLES, born April 20, 1839, was in 1866 elected prince of Roumania. (See CHARLES I. of Roumania, vol. iv., p. 309.) ANTHONY, the third son, born Oct. 7, 1841, died July 5, 1866, from wounds which he received at the battle of Königgrätz, July 3. FREDERICK, the fourth son, born June 25, 1843, is an officer of the Prussian dragoons of the guard.

HOLBACH, Paul Henri Thyry (or DIETRICH) d', baron, a French philosopher, born at Heidelberg, near Carlsruhe, in 1723, died in Paris, Jan. 21, 1789. He was taken to Paris when very young by his father, from whom he inherited a considerable fortune. A large part of this he expended in hospitalities to the free-thinkers of his time, whom he regularly entertained at his splendid table, so that Galiani styled him the *premier maître d'hôtel de la philosophie*. The boldest opinions and the most irreligious principles were here discussed without restraint. Much information concerning these dinner parties is given in the memoirs of the abbé Morellet, of Mme. d'Épinay, in Grimm's "Correspondence," and in the curious but not impartial work of Mme. de Genlis, *Les dîners du baron d'Holbach*. Holbach attacked with great zeal Christianity and all other positive religions, and labored for the promulgation of naturalistic ideas. He began his literary career by translating a number of German philosophical works. He edited and published in 1759 the works of Boulanger, a young engineer, who died in that year, and afterward published under Boulanger's name his own works, *Le Christianisme dévoilé, ou examen des principes et des effets de la religion révélée* (1767), and *L'Esprit du clergé, ou le Christianisme primitif vengé des entreprises et des excès de nos prêtres modernes*, which a decree of parliament, Aug. 18, 1770, sentenced to be burned by the public executioner. The same year he published his most celebrated book, *Le système de la nature, ou des lois du monde physique et moral*, under the fictitious name of Mirabaud, *secrétaire perpétuel de l'académie française*; this created such scandal that Voltaire himself thought proper to refute it in the article *Dieu* of his *Dictionnaire philosophique*, while Goethe declared that he recoiled from it in abhorrence as from a "cadaverous spectre." It passed, however, through eight editions between 1817 and 1824, and a new edition in German was published in Leipsic in 1843. In 1772 a short pamphlet, *Le bon sens, ou idées naturelles opposées aux idées surnaturelles*, reproduced in a more familiar form the principles he had previously advocated; and this pamphlet, which has been frequently reprinted and largely circulated under the title of *Le bon sens du curé Meslier*, has more powerfully than any other publication contributed to diffuse the principles of infidelity among the middle classes in France. *Le système social, ou les principes naturels de la morale et de la politique*, appeared in 1773, and *La morale universelle, ou les devoirs de l'homme fondés sur la nature*, in 1776. Most of these works were, as soon as they appeared, proscribed by the church and the parliament, and were even disclaimed by philosophers. All his writings appeared either anonymously, or under the name of deceased persons, or as translations from the English. In his literary performances he had the help of La-grange, the teacher of his children, of Nai-

geon, to whose supervision he confided all his works, and of Diderot.

HOLBEIN, Hans, or Johann, called the Younger, a German painter, born in Augsburg or Gränstadt between 1495 and 1498, died of the plague in London in 1554 or in 1543. He was the son of a painter of the same name (Hans the Elder), of considerable eminence during the latter half of the 15th century, and while a boy followed his father to Basel. Here he executed remarkable works for private houses, public buildings, and churches, many of which have been preserved. About 1526 he contracted an intimacy with Erasmus, whose portrait he painted, and soon after visited England, where he passed the remainder of his life. A letter from Erasmus recommended him to Sir Thomas More, who introduced him at court. Henry VIII. at once made him court painter, with a liberal pension, and thenceforth Holbein was intrusted with many commissions, chiefly for portraits, both from the king and the principal personages of the kingdom. He is distinguished as a historical and portrait painter, and engraver on wood. He painted in oils and distemper, and excelled in miniatures. As an engraver he is chiefly known by the celebrated "Dance of Death," a series of 53 woodcuts engraved from his own designs, although it is seldom found with more than 46. (See DANCE OF DEATH.) This series has been frequently engraved, and the prints of Wenzel Hollar are particularly fine. It is said that he used the left hand in painting.—The Holbein collection in the museum of Basel, which had been prepared by his friend Amerbach, comprises the portraits of the latter and of Holbein's wife and children, and other masterpieces. His portraits of Sir Thomas More and other personages are at Windsor, and many are at Kensington and in various English and continental galleries, private and public. Much controversy exists in regard to the genuineness of some of the works ascribed to him, especially in respect to two pictures both claiming to be originals and representing the "Madonna of the Burgomaster Meyer of Basel;" one of these is in Darmstadt, and the other in Dresden; both were critically examined in 1871 by competent authorities, but without a decision on the subject. Many works have appeared in modern times on Holbein's life and works, the latest of which is *Holbein und seine Zeit*, by A. Woltmann (2 vols., Leipsic, 1868; revised, with illustrations, 1874).

HOLBERG, Ludvig, baron, a Danish dramatist, born in Bergen, Norway, Nov. 6, 1684, died in Copenhagen, Jan. 28, 1754. When a boy he was placed under the care of the bishop of Munthe, his relative, who caused him to be sent to the college of Bergen, whence at the age of 18 he went to the university of Copenhagen, where he graduated in 1705, and afterward studied philosophy at Oxford. Returning to Copenhagen after 15 months, he was made professor extraordinary in the university,

and was commissioned to examine and report upon the Lutheran schools of Holland. He was again appointed professor in the university, first of metaphysics (1718), but ultimately of rhetoric (1720). In 1722 he produced his comedy "The Political Timan," which received unbounded applause; and at very short intervals 14 other pieces were composed and played with increasing success. His patron Frederick IV. was succeeded in 1730 by King Christian VI., whose religious zeal led him to forbid theatrical entertainments; but Holberg's "Sleep-er Awakened," "John of France," "Lying-in Chamber," "False Savant," and others, all pictures in caricature of the manners of the Danish middle classes, had been stamped indelibly upon the public mind. He next wrote a satirical romance in Latin (1741) called "The Subterranean Travels of Nicholas Klim," which was translated into many languages. Frederick V. restored the theatre in 1746, and gave Holberg a patent of nobility. He never married, and bequeathed his property chiefly to an academy which had been founded at Soroe by Christian IV. for the education of young noblemen. He gave 16,000 crowns as a fund to portion a number of young Danish women. His *Danmarks Riges Historie* (3 vols., 1732-'35) was the first attempt at writing a thorough history of Denmark. His "History of the Jews" and "Stories of Heroes and Heroines" are works of lasting merit. A collection of his works in 27 vols. appeared at Copenhagen in 1826. He left an "Introduction to Universal History" in Latin, translated into English by Gregory Sharpe, LL. D. (8vo, London, 1755), and his autobiography, an English translation of which also appeared in London in 1830. In 1842 the Holberg society was founded at Copenhagen, which published a critical edition of his comedies (7 vols., 1843-'53).

HOLBROOK, John Edwards, an American naturalist, born in Beaufort, S. C., in 1795, died in Norfolk, Mass., Sept. 8, 1871. He graduated at Brown university in 1815, studied medicine in Philadelphia, spent two years in Italy, Germany, and Paris, established himself in Charleston in 1822, and in 1824 was chosen professor of anatomy in the medical college of South Carolina. His most important work is the "American Herpetology, or a Description of Reptiles inhabiting the United States" (5 vols., Philadelphia, 1842). He began a work on "Southern Ichthyology," but finding the field too wide, he confined his labors to the fishes of South Carolina. Of this work ten numbers were published (Charleston, 1854 *et seq.*), when the publication was stopped by the outbreak of the civil war.

HOLCROFT, Thomas, an English dramatist, born in London, Dec. 10, 1745, died March 23, 1803. His father was a shoemaker who owned several horses, and added to his income by letting them. His mother dealt in greens and oysters. He passed his early life in London and in Berkshire, following the occupa-

tions of his father. He was afterward in the service of a trainer of race horses at Newmarket, then a schoolmaster, and then an actor, but soon abandoned the stage, as he met with little success. The most popular of his dramatic compositions is "The Road to Ruin" (1792). At the time of the French revolution he incurred the suspicions of government as a member of the society for constitutional information, and with Horne Tooke, Hardy, Thellwall, and others, was in 1794 indicted for high treason. Some of the accusers were acquitted, and Holcroft was discharged with others, without being brought to trial. He wrote about 30 plays and four novels, published translations of Lavater's "Physiognomy" and the works of Frederick the Great, and "Travels in France and Germany" (2 vols. 4to, 1806). His "Memoirs," written by himself and edited by Hazlitt, were published in 1816, in 3 vols. 12mo.

HOLINSHED, *Holingshed*, or *Hollynsed*, *Raphael*, an English chronicler, born in the first half of the 16th century, died about 1580. He probably received a university education, and is supposed to have taken orders. Little else is known of his life. Of the "Chronicles of England, Scotland, and Ireland" (2 vols. fol., London, 1577), his share comprises the histories of England and Scotland, the latter being for the most part a translation from the Latin of Hector Boëthius. The other portions were done by Stow, Harrison, Hooker, and others. The second edition containing matter added by Thynne, which was offensive to Queen Elizabeth, means were taken to suppress certain sheets in that edition, which were restored in that of 1807. Shakespeare was largely indebted to Holinshed, whole pages in "Macbeth," and the character of Wolsey in "Henry VIII.," being almost word for word taken from the "Chronicles."

HOLLAND. I. A division of the Netherlands, comprising the present provinces of North and South Holland, which in the middle ages successively formed a part of the Frankish empire, of Lorraine, and of the German empire, being governed by counts, of whom those of Vlaardingen rose to considerable power. This line became extinct in 1299, and the land was inherited by the counts of Hainaut. In the middle of the 14th century arose a dispute between Margaret, wife of the emperor Louis the Bavarian, who had inherited the county after the death of her brother Count William IV., and her son William V., which threw it into long continued conflicts between two parties who took the names of *Hoeks* (hooks) and *Kabeljaauws* (codfish). Finally, in 1430, the county was annexed to Burgundy. (See *BURGUNDY*, and *NETHERLANDS*.)—The kingdom of Holland, under the rule of Louis Bonaparte, from 1806 to 1810, included nearly all the territory of the present kingdom of the Netherlands, together with part of the former kingdom of Hanover and the duchy of Oldenburg.

II. North, a province of the kingdom of the

Netherlands, bounded W. and N. by the North sea, E. by the Zuyder Zee, and S. by Utrecht and South Holland; area, 1,054 sq. m.; pop. in 1872, 602,539. The islands of Terschelling, Vlieland, and Texel, in the North sea, and Wieringen, Marken, and a few smaller ones, in the Zuyder Zee, belong to it. The surface is flat, increasing in depression toward the north, and the districts of Waterland, Kennemerland, and Purmerland are partially below the level of the sea. Expensive dikes extend along the whole coast of the North sea, and for about 100 m. on the coast of the Zuyder Zee. Haarlem lake has been closed and drained. (See *DRAINAGE*, and *HAARLEM MEER*.) The river Y penetrates far into the land, which is crossed by numerous small rivers, and drained by a still larger number of canals. The climate is damp, changeable, and cool. Flowers are cultivated, especially about Haarlem. Hemp, flax, and madder are raised. Wood is scarce; the pasturage is excellent, and horses, cattle, and swine abound. There are important manufactures of linen, paper, woollen cloths, silks, carpets, leather, sugar, &c. Capital, Amsterdam.

III. South, a province of the Netherlands, bounded W. by the North sea, N. by North Holland, E. by Utrecht and Gelderland, and S. by the Maas and its mouths; area, 1,155 sq. m.; pop. in 1872, 710,753. The islands of Ysselmonde, Voorne, Beijerland, and Overflakkee form part of its territory. The general character of the province resembles that of North Holland. There are numerous canals, rich pasture lands, and fertile fields. Portions of the Bies-Bosch, a shallow marshy lake formed by the inundation of 1421, have of late been reclaimed, and converted into meadow land. Capital, the Hague.

HOLLAND, *Sir Henry*, an English physician, born at Knutsford, Oct. 27, 1788, died in London, Oct. 28, 1873. He studied at the university of Glasgow, where in 1805 he gained the prize for English verse. In 1811 he took his degree of M. D. at the university of Edinburgh, and then travelled for two years in Greece and the Ionian islands, publishing an account of his travels in 1815. Subsequently he established himself in London, and in 1828 was elected a fellow of the royal college of physicians. In 1834 he married, as his second wife, Saba, a daughter of Sydney Smith, who published a life of her father in 1855, and died in 1866. In 1852 he became physician in ordinary to the queen, and in 1853 was made a baronet. During many years he was accustomed to make an annual trip of two months to foreign countries. He visited the United States several times, and there were few public men in Europe or America with whom he was not personally acquainted. He contributed largely to periodicals, and published several works, the most important of which are: "Medical Notes and Reflections" (1839); "Chapters on Mental Physiology" (1852); "Essays on Scientific and other Subjects" (1862); and "Recollections of

a Past Life" (1871). His son by his first wife, Sir Henry Thurstan Holland, is to arrange and publish a collection of his papers (1874).

HOLLAND, Henry Richard Vassall, baron, an English statesman, born at Winterslow house, Wiltshire, Nov. 21, 1773, died at Holland house, Kensington, Oct. 22, 1840. He was the only son of Stephen Fox, second Lord Holland, and a nephew of Charles James Fox, at whose hands, according to Macaulay, he received his "political education." He succeeded to his father's title when a little more than a year old, and was educated at Eton, and subsequently at Oxford, where he graduated in 1792. In 1793 he travelled extensively over Spain, making himself familiar with the language and literature of the country, and subsequently visited other portions of the continent. In Italy he formed a connection with Elizabeth, daughter and heiress of Richard Vassall, and wife of Sir Godfrey Webster, who procured a divorce from her and recovered damages in £6,000 from Lord Holland. The latter married her in 1797, and took by royal license the surname of Vassall, in lieu of his patronymic of Fox; but his children retained the latter name. In 1798 he made his first speech in the house of lords, and thenceforth was a frequent participator in debates, being to the close of his life a steady and consistent whig. Between 1802 and 1805 he made another long visit to Spain, and in 1806 he was appointed joint commissioner with Lord Auckland to arrange with Messrs. Monroe and Pinkney, the American commissioners, the matters in controversy between England and the United States. In 1806 he published "Some Account of the Life and Writings of Lope Felix de Vega Carpio," to which he subsequently added a biography of Guillen de Castro, which appeared in 1817 under the title of "Lives of Lope de Vega and G. de Castro." This work, the fruit of its author's visits to Spain, without aiming at profoundness, treats the subject in a genial and appreciative manner. It was followed in 1807 by "Three Comedies from the Spanish," and in 1808 he edited, with a long preface, Mr. Fox's fragment entitled "A History of the Early Part of the Reign of James II." He held the office of privy seal for a few months in 1806, and resigned with his colleagues after the death of Fox, because the king refused to concur in Catholic emancipation, and on account of the failure of the negotiations with France. He resided in a private capacity at Vienna during the session of the congress of 1814-'15, and rendered himself conspicuous by an ardent opposition against the policy adopted toward Napoleon, until the government ordered him to leave the city. Several times in parliament he demanded a milder treatment of the ex-emperor at St. Helena. Lady Holland assisted the prisoner by sending him books, periodicals, and other comforts. Under the reform ministry of Grey in 1830 he was unable from ill health to accept

an appointment as cabinet minister, but he took the office of chancellor of the duchy of Lancaster, because it gave him a vote in the cabinet council, and held it until his death, with the exception of the brief ministerial interregnum in May, 1832, and the period of Sir Robert Peel's administration from December, 1834, to May, 1835. Lord Holland was much esteemed in private life for his courtly grace of manner, genial humor, and amiability; and Holland house, his suburban residence, a building having many interesting historical associations, and stored with much that was rare and beautiful in art and literature, was for nearly 50 years the resort of eminent personages and the scene of elegant hospitality. (See "Holland House," by Princess Maria Liechtenstein, an adopted daughter of the fourth Lord Holland, 2 vols., London, 1874.) Although in mental calibre inferior to Charles James Fox, to whom he bore a strong family resemblance, he was an effective speaker, and, according to Macaulay, was more distinguished in debate than any peer of his time who had never sat in the house of commons. His "Foreign Reminiscences," published by his son (8vo, London, 1850), is a work full of gossip and piquant anecdotes. The first two volumes of "Memoirs of the Whig Party during my Time, by Henry, Lord Holland" (1854, edited by his son), are inferior to his earlier works. A publication entitled "The Opinions of Lord Holland, as recorded in the Journals of the House of Lords from 1797 to 1840," appeared in London soon after his death, affording a complete view of his public career. He had projected a life of his uncle, but never advanced beyond the collection of a few notes and materials, which are included in Lord John Russell's "Memoirs and Correspondence of Charles James Fox."—He was succeeded by his son, HENRY EDWARD, fourth baron, born March 7, 1802, died in Naples, Dec. 18, 1859. He was member of parliament for Horsham in 1826-'7, and in 1839-'42 minister to Tuscany. As he died without issue, the title became extinct, Holland house and the other estates being inherited by his sister, married to Thomas, Lord Lilford, who died March 15, 1861.

HOLLAND, Josiah Gilbert, an American author, born in Belchertown, Mass., July 24, 1819. Having studied medicine and practised for three years, and afterward edited a literary journal for a few months in Springfield, Mass., he passed a year in Vicksburg, Miss., as superintendent of public schools. In May, 1849, he became associate editor of the "Springfield Republican," and two years afterward one of the proprietors of that journal, in which connection he remained till 1866. Since 1870 he has been the conductor of "Scribner's Monthly" in New York. He has for many years been a public lecturer on social and literary topics, and has written many books, those of a didactic character under the *nom de plume* of "Timothy Titcomb." This series includes "Letters

to the Young" (New York, 1858), "Gold Foil" (1859), "Lessons in Life" (1861), and "Letters to the Joneses" (1863). His other publications are: "History of Western Massachusetts" (2 vols., Springfield, 1855); "The Bay Path," a novel (New York, 1857); "Bitter-Sweet," a poem in dramatic form (1858); "Miss Gilbert's Career," an American story (1860); "Plain Talks on Familiar Subjects" (1865); "Life of Abraham Lincoln" (Springfield, 1865); "Kathrina," a poem (New York, 1868); "The Marble Prophecy and other Poems" (1872); and "Arthur Bonnicastle," a novel (1873). In 1873 a complete edition of his poems was published in New York, under the title of "Garnered Sheaves."

HOLLAND, Sir Nathaniel Dance, an English artist, born in London in 1784, died in Winchester in 1811. He was the son of George Dance, the architect of the mansion house in London, and early devoted himself to painting, passing several years in Italy in the study of his art. On his return to England he distinguished himself as a painter of portraits, of which that of Garrick as Richard III. affords a good example, and also of history and landscape. By his captivating figure and address he was enabled to secure the hand of Mrs. Dummer, a wealthy Yorkshire heiress, after which he relinquished his profession, assumed the name of Holland, was made a baronet, and entered parliament. He still exhibited occasionally as an amateur.

HOLLAND, Philemon, an English scholar, born at Chelmsford in 1551, died Feb. 9, 1636. He was educated at Trinity college, Cambridge, became master of the free school at Coventry, and also practised medicine. He was the first English translator of Livy, Suetonius, and Plutarch's "Morals." He also translated Ammianus Marcellinus, the "Natural History" of Pliny, the "Cyropædia" of Xenophon, and Camden's "Britannia."

HOLLAR, Wenzel, a Bohemian engraver, born in Prague in 1607, died in London, March 28, 1677. At 18 years of age he produced his plates of the "Virgin and Child" and the "Ecce Homo." In 1636 he attracted the attention of the earl of Arundel, the British ambassador to the German emperor, who took him in his suite to England. He now practised his art with great reputation and success, and executed portraits of the royal family and of the earl of Arundel, besides views of places, and a set of 28 plates of female costume of all ranks, entitled *Ornatus Muliebris Anglicanus*. Under the commonwealth he became somewhat involved in political affairs through his association with the royalist friends of his patron, with several of whom he was taken prisoner at the surrender of Basing House in Hampshire in 1645. Being set at liberty after a short imprisonment, he joined the earl of Arundel in Antwerp, where he passed several years. During this period he engraved Holbein's "Dance of Death" and other works of the

old masters. He returned to England in 1652, but in the latter part of his life became reduced to great indigence. His prints numbered nearly 2,400, many of them of small size executed for the booksellers, who paid him at the rate of fourpence an hour.

HOLLIDAYSBURG, a borough and the capital of Blair co., Pennsylvania, on Beaver Dam creek, a branch of the Juniata, about 85 m. E. of Pittsburgh, and the same distance W. by N. of Harrisburg; pop. in 1870, 2,952. It is situated near the base of the Alleghany mountains, on a branch of the Pennsylvania Central railroad, and is a terminus of the E. division of the main line of the state canal. It is the centre of a large trade by railroad and canal, having most of the forwarding business of a rich surrounding country abounding in agricultural and mineral resources. The iron of the Juniata region and large quantities of anthracite coal and grain are exported through this town. It contains several foundries, rolling mills, blast furnaces, machine shops, flour mills, a national bank, and two weekly newspapers. Hollidaysburg was incorporated in 1836. Gaysport on the opposite bank of the river, with which it is connected, is a borough of 799 inhabitants.

HOLLIS, George N., an American naval officer, born in Baltimore, Sept. 20, 1799. He entered the navy as midshipman in 1814, and was on board the President, Commodore Decatur, when she was captured by the British, and remained a prisoner of war at Bermuda until the peace. He next served under Decatur against the Algerines. At the close of the war he took command of an East India merchantman, and became lieutenant in the navy in 1825, and commander in 1841. He bombarded and destroyed the town of San Juan de Nicaragua in 1854. After commanding the navy yard at Sackett's Harbor for a short time, he was ordered to join the Mediterranean squadron. In 1855 he was promoted to captain. Returning to the United States in 1861, he resigned his commission; but the department refused to accept the resignation, struck his name from the rolls, and ordered his arrest. He escaped to the south, entered the Confederate navy, received a commission as commodore, and on Oct. 11 attacked the federal blockading squadron at the passes of the Mississippi, doing slight damage, but claiming an important victory, and was therefore appointed flag captain of the New Orleans station. Before Farragut's attack on that city in April, 1862, he was superseded by Commodore Whittle.

HOLLIS, Thomas, a benefactor of Harvard college, born in England in 1659, died in London in 1731. He was for many years a successful merchant in London, and a bequest made to Harvard college in his uncle's will, of which he was trustee, first attracted his attention to that institution. Having made two considerable donations, he gave directions in 1721 for the employment of the fund, by

which the Hollis professorship of divinity was constituted. He was himself a Baptist, and the candidate for the professorship was required to be of "sound or orthodox principles." In 1727 he established also a professorship of mathematics and philosophy, and the net produce of his donations amounted at that time to £4,900. He also gave books for the library, and secured from a friend a set of Hebrew and Greek types for printing. His memoirs were published by Thomas Brand Hollis (2 vols. 4to, London, 1780).—His nephew, Thomas Hollis, also gave money, books, and philosophical apparatus, and left a son, the third Thomas Hollis (died in 1774), an antiquary, whose donations to the college amounted to nearly £2,000.

HOLLOWAY, Thomas, an English engraver, born in London in 1748, died at Coltishall, near Norwich, in 1827. He was apprenticed to a seal engraver, and became known by his plates illustrating Dr. Hunter's translation of "Lavater's Essays on Physiognomy" (5 vols., 1792, with about 700 plates), and by similar works, the most celebrated of which, on account of their elaborate execution, are his engravings of the cartoons of Raphael. A memoir of his life was published in 1827.

HOLLY, the common name of several ever-green species of *ilex*, of the order *aquifolia-ceæ*. They have small axillary flowers, which when perfect are inclined to be solitary, but when sterile are in small clusters; these have a four-toothed calyx and as many petals, which are separate or only united at the base; stamens four; fruit a berry-like drupe containing four nutlets. The American holly, *ilex opaca*,

and the branches spread horizontally; the short-petioled leaves are oval in outline, with scattered spiny teeth, very thick and leathery, deep green above, and yellowish green beneath. This was formerly supposed to be identical with the European holly, but that has more



European Holly (*Ilex aquifolium*).



American Holly (*Ilex opaca*).

is found along the Atlantic coast from Maine southward, it being especially abundant in Virginia and the states south of it; as seen at the north, it is a low tree, but in a favorable climate it attains a height of 30 or 40 ft.; the erect trunk is clothed with an ashy-gray bark,

glossy leaves with much more conspicuous spines, brighter scarlet berries, and the nutlets more strongly veined. It is much more hardy than the European, which will not endure the climate of New York city with certainty, but it is not often seen in cultivation. There is no difficulty in removing small plants from their native localities, if the top be so far cut back as to remove all the foliage; new shoots will start in abundance if the tree be treated in this manner, but if removed with all its foliage success is very doubtful. The uses of our species are the same as those of the European holly, *I. aquifolium*, which has long been a favorite in Great Britain as a hedge plant and for the ornamental character of single specimens. It is especially abundant in the south of Europe, but is not found in the northern portions, it not being hardy even in the north of Scotland. It is a very long-lived tree, some specimens having been estimated to be 800 and 1,200 years old. There are numerous varieties. Some of the green ones have the leaves entirely without spines, while others, such as the hedgehog holly, have them developed to a remarkable degree; there are several in which the foliage is beautifully margined or blotched with pure white or yellow, some of which are among the finest ornamental plants. There are also yellow- and white-fruited varieties. As specimen plants, the hollies are pruned in a pyramidal form, making a cone of dense green, with its base close to the ground, or they are made to assume the form of a tree with a clean trunk 3 ft. or more high. The variegated hollies are so fine that some American amateurs cultivate them in large pots or tubs, which are

plunged in the ground during summer and removed to a cellar or other shelter for the winter. In Europe the holly is used for an ornamental hedge; it forms an impenetrable barrier, but is of too slow growth for a mere protecting hedge. There are in England many fine specimens of holly screens, 20 ft. high, and filled with dense foliage from the very bottom. The dark persistent leaves, against which the bright scarlet berries show in fine contrast, make the holly a favorite plant for Christmas decorations; it is said to have been used for this purpose by the early Christians in Rome, and is in Europe still the plant chiefly employed in churches. Large quantities of the native holly are brought each year from Long Island and southern New Jersey to the New York market for the same use. The wood of the holly is remarkably white, except that at the centre of old trees, which is brown; it has a fine grain and a satiny lustre that well adapt it to ornamental work; it is used for small carved and turned articles, for whip and other handles, for inlaid work, and for various other purposes requiring a white, fine-grained wood. It receives dyes of various kinds readily, and much of what passes for ebony is the wood of the holly dyed black. Bird lime was formerly made from the mucilaginous matter furnished by the bark when boiled and fermented. The berries are purgative and emetic, and a decoction of the bark is sometimes used as a demulcent. The common holly is raised from seeds, which are kept in a rot heap mixed with earth for a year, and then sown; the finer varieties are propagated by budding or grafting them in the usual manner upon these seedlings.—The other native evergreen species of *ilex* are the *I. Cassine* (see YAUPON), *I. Dahoon*, and *I. glabra* (see INKBERRY), which are shrubs with serrate or toothed, not spiny leaves. The Dahoon holly, not found north of Virginia, has leaves varying from oblong to linear-oblong, sharply serrate, downy beneath. A narrow-leaved form has been called *I. myrtifolia*. The deciduous species of *ilex* were formerly placed in a separate genus, *prinos*, but modern botanists include them in *ilex*; the most important of these are noticed under WINTERBERRY. A South American species, *I. Paraguayensis*, is the Paraguay tea. (See MATÉ.)

HOLLYHOCK (*althæa rosea*), an ornamental plant of the order *malvaceæ*, introduced into English gardens from Syria in 1573. In warm countries it is a perennial, but with us it is a biennial with large, rounded, heart-shaped, angled, or lobed, rough leaves, and a stem 6 ft. or more high, upon the upper portion of which are placed the nearly sessile large flowers, so closely together as to form a dense spike 3 ft. or more in length. The calyx, of five sepals, is subtended by an involucre of several bracts, united at the base, giving the appearance of a double calyx; the petals are five, obcordate and united at the base with the staminal column, which consists of united filaments, and is

anther-bearing at the top; pistils several, their ovaries united in a ring around a central axis, from which they fall away when ripe in as many one-seeded carpels as there were styles. The original hollyhock was single, and of a rose or purplish color, a form now rarely seen. No plant of our gardens has been more improved by cultivation than this; semi-double flowers are very common, and the choicer kinds have the flower completely filled with petals and form hemispherical masses of great beauty. Even in the most double forms the original five petals remain unchanged, often showing as a narrow border around the central petals, which are much crowded, crimped, and folded, and of a delicate crape-like texture. In color a great change has been effected also; we now have white, shades of yellow, pink running through various shades of red to purple, the latter being in some so dark as to be called black. Not only are there self-colored



Dwarf Double Hollyhock.

flowers, but those in which the tints are varied by streaks, veining, and shading, and sometimes the under sides of the petals are of a different color from the upper. On account of the size and showy character of its flowers, the hollyhock is well adapted to garden decoration, and is usually planted where it can be seen from a distance; if the flower spikes are relieved by a background of green, their effect is much enhanced. Some of the more delicately tinted ones are often used by florists in making up large bouquets and floral decorations; the central portion of the flower is furnished with an artificial stem, and when worked in with other flowers those unfamiliar with the matter would not suspect its real nature. However double a hollyhock may be, it still remains partially fertile, and seeds from the finer kinds, if they have not been fertilized through the agency of insects by pollen from inferior sorts, will reproduce the variety with considerable

certainly; a large proportion of the seed of a good strain will produce fine flowers; hence this, being the least troublesome, is the most common method of propagation. As the plants do not bloom until the second year, they are kept for the first season in a reserve bed, and set where they are to flower in the fall after sowing, or in the following spring. If the flower stalks, as soon as the flowers are past their prime, are cut away, the root may be taken up, divided, and reset; in this way a choice specimen may be kept along year after year; the named sorts of the fanciers are propagated in this way as well as by cuttings of the stalks treated in the usual manner. Even grafting is resorted to in the case of very fine sorts, scions made from the stems being set upon the roots of any common kind. Cultivators prefer the dwarfer specimens, they being less injured by winds than the tall, and by selecting in this direction the height of the plants is much less than formerly. The hollyhock has usually been free from enemies of all kinds, but in 1873 a parasitic fungus, *puccinia malvacearum*, heretofore only known in South America and Australia, appeared in England and France; the only known remedy is to destroy all affected plants and thus prevent its increase. The roots of the plant are mucilaginous, and are sometimes substituted for those of marsh-mallow, but they are coarser and darker colored. The French use the dried flowers in infusions, probably more for the color they impart than for any medicinal quality.

HOLMAN, James, known as "the blind traveler," born in England about 1787, died in London in July, 1857. He entered the royal navy in 1798, and nine years afterward received a commission as lieutenant. In 1812 he lost his eyesight, and the king consequently appointed him one of the six naval knights of Windsor. During the years 1819-'21 he travelled through France, Italy, Savoy, Switzerland, and along the Rhine, and published an account of his impressions, which was so well received by the public that he set out in 1822 on a journey around the world. Commencing at St. Petersburg, he took the route by Moscow, Novgorod, and Irkutsk, intending, when the season should permit, to proceed through Mongolia and China; but being suspected as a spy, he was stopped by an order from the Russian government and sent back under escort to the German frontier, whence he returned to England in 1824. He published in 1825 an account of this journey, under the title of "Travels in Russia," &c. The five years from 1827 to 1832 he passed in a voyage around the world, of which he published an account in 1834. His route was from England to Madeira, Teneriffe, and the west coast of Africa, thence to Brazil, which he passed some time in visiting, thence to Cape Colony, Caffraria, Madagascar, Mauritius, Ceylon and India, New South Wales, Van Diemen's Land, and New Zealand, returning by Cape Horn to England. He afterward, in

1843-'4, made a tour in the Danubian principalities and Transylvania. His books are more curious than useful.

HOLMBOE, Christopher Andreas, a Norwegian philologist, born at Vang in 1796. He studied in Christiania, and also in Paris under Sylvestre de Sacy and Caussin de Perceval, and became in 1822 professor at the university of Christiania. His works, written in Norwegian, Danish, German, French, and Latin, relating to Scriptural studies, archæology, numismatics, and comparative philology, include *De Prisca Re Monetaria Norvegiæ* (Christiania, 1841; 5th ed., 1854); *Sanskrit og Oldnorske* (1846); *Det norske Sprog væsentligste Ordforraad sammenlignet med Sanskrit* (1852); and *Traces du bouddhisme en Norvège avant l'introduction du christianisme* (Paris, 1857-'70).

HOLMES. I. A N. W. county of Florida, bordering on Alabama, and intersected by the Choctawhatchee river; area, 396 sq. m.; pop. in 1870, 1,572, of whom 137 were colored. Its surface is nearly level. The soil is a rich alluvium in the river bottoms, and sandy elsewhere. The chief productions in 1870 were 18,424 bushels of Indian corn, 7,035 of sweet potatoes, 116 bales of cotton, 4,480 gallons of molasses, 2 hogsheds of sugar, and 76,985 lbs. of rice. There were 116 horses, 1,112 milch cows, 3,749 other cattle, 1,237 sheep, and 3,543 swine. Capital, Cerro Gordo. **II.** A central county of Mississippi, bounded S. E. by Big Black river and N. W. by the Yazoo; area, 756 sq. m.; pop. in 1870, 19,370, of whom 13,225 were colored. It has an undulating surface and a very rich soil. The Yazoo is navigable by steamboats in this part of its course during the whole year, and the New Orleans, Jackson, and Great Northern railroad passes through the county near its S. E. border. The chief productions in 1870 were 352,623 bushels of Indian corn, 16,433 of sweet potatoes, and 19,027 bales of cotton. There were 1,110 horses, 2,343 mules and asses, 2,962 milch cows, 5,838 other cattle, 2,680 sheep, and 10,426 swine. Capital, Lexington. **III.** An E. central county of Ohio, intersected by Kilbuck creek and watered by Walhonding river; area, 405 sq. m.; pop. in 1870, 18,177. It has a diversified surface and a soil of generally good quality. Coal is found near Kilbuck creek, and gas springs have been discovered. The Cleveland, Mt. Vernon, and Delaware, and the Pittsburgh, Fort Wayne, and Chicago railroads pass through it. The chief productions in 1870 were 351,516 bushels of wheat, 569,895 of Indian corn, 538,383 of oats, 18,275 of barley, 102,117 of potatoes, 246,520 lbs. of wool, 589,193 of butter, and 26,410 tons of hay. There were 7,015 horses, 14,805 cattle, 62,491 sheep, and 20,111 swine; 11 flour mills, 2 saw mills, 3 manufactories of agricultural implements, 1 of furniture, and 3 of woollen goods. Capital, Millersburg.

HOLMES, Abel, an American clergyman, born in Woodstock, Conn., Dec. 24, 1763, died in

Cambridge, Mass., June 4, 1837. He graduated at Yale college in 1783, and became subsequently a tutor in the college, pursuing at the same time his theological studies. In 1785 he was settled over a parish at Midway, Ga., where he remained till compelled by ill health to resign his charge in 1791. In 1792 he became pastor of the first parish in Cambridge, and continued to fill the office till Sept. 26, 1832. Dr. Stiles, his father-in-law, at his decease had bequeathed to him his large collection of manuscripts, containing researches upon various subjects, and from these Dr. Holmes wrote a "Life of President Stiles," which was published in 1798. The study of these papers turned his attention to the early history of America, and he devoted himself to the composition of the "Annals of America" (2 vols. 8vo, Cambridge, 1805), which established for its author a high reputation for accuracy, and has maintained its place as a leading authority in American history. It was republished in England in 1813, and in 1829 a new and enlarged edition was published in this country, bringing the annals down to 1820. Dr. Holmes contributed frequently to the "Collections of the Massachusetts Historical Society," in vol. xxvii. of which will be found a complete list of his publications. In 1817 he delivered a course of lectures upon ecclesiastical history, particularly that of New England, which have not been published.

HOLMES, George Frederick, an American educator, born in Demerara, Guiana, in 1820. He was brought up and educated in England. When 11 years of age he was presented by the bishop of Bristol with a scholarship in the London university, admitting him to the senior class. This was not accepted, but at a later period he went to the university of Durham, and gained an open scholarship. He came to the United States at the age of 18, and was engaged in a classical academy near the Wilderness, Virginia, in 1838-'9. Next he taught in Georgia. In 1840 he was placed in charge of the Walterborough academy, South Carolina. He had while teaching studied jurisprudence, and in 1842 was authorized by a special act of the South Carolina legislature to practise law, although not naturalized. Soon afterward he was made assistant editor of the "Southern Quarterly Review." In 1845 he was recalled to Virginia as professor in Richmond college; and in 1847 he became professor of history, political economy, and international law in William and Mary college. In 1846 he was elected president of the university of Mississippi, with the departments of mental and moral philosophy, political economy, and history. He held this post but a short time, declining health obliging him to seek rest in the Virginia mountains. In 1857 he was elected professor of history and literature in the university of Virginia. He has prepared a series of text books designed especially for schools in the southern states.

HOLMES, John, a Canadian author, born at Windsor, Vt., in 1799, died at Lorette, near Quebec, in 1852. He was preparing to enter the ministry of the Wesleyan church, when he embraced the Roman Catholic faith; he studied philosophy and theology in the seminary of Montreal, became professor in the college of Nicolet, where he was ordained priest, and spent some time as a missionary in the Eastern Townships. In 1828 he entered the seminary of Quebec as professor, was elected one of its directors, and soon became principal of the seminary. In 1836 he was commissioned by the provincial government to inquire into the system of normal schools in Europe and America, and returned to Canada in 1837 with professors, apparatus, &c., for the Canadian normal school, which was opened forthwith in Montreal. From 1838, owing to a domestic affliction, he lived in seclusion, only appearing to deliver Lenten courses of lectures, published in 1850 as *Conférences de Notre Dame de Québec*. His *Manuel abrégé de géographie moderne* has reached its sixth edition.

HOLMES, Oliver Wendell, an American author, son of the Rev. Abiel Holmes, born in Cambridge, Mass., Aug. 29, 1809. He graduated at Harvard college in 1829, and entered upon the study of the law, which he soon abandoned for medicine, and in 1832 went to Europe to pursue his studies, passing several years in attendance on the hospitals of Paris and other large cities. He received the degree of M. D. in 1836, in 1838 was chosen professor of anatomy and physiology in Dartmouth college, and in 1847 was elected to fill the same chair in the medical college of Harvard university. Early in his college life he attracted attention as a poet. He contributed to the "Collegian," a periodical conducted by the undergraduates of the college, and also to "Illustrations of the Athenæum Gallery of Paintings" in 1831, and to the "Harbinger, a May Gift," in 1833. In 1836 he read before the Phi Beta Kappa society "Poetry, a Metrical Essay," which was published in the first collected edition of his "Poems" (Boston, 1836). "Terpsichore" was read by him at a dinner of the same society in 1843, and "Urania" was published in 1846. In 1850 he delivered before the Yale chapter of the same society a poem entitled "Astræa," which was published in the same year. His poems have passed through many editions since they first appeared in a collected form, and have been republished at different times in England. He has been a frequent contributor to periodical literature. In the "Atlantic Monthly" (Boston, 1857) he began a series of articles under the title of "The Autocrat of the Breakfast Table," which were continued for a year, and constituted one of the most brilliant events in contemporary American literature. They were followed by "The Professor at the Breakfast Table," and in 1872 by "The Poet at the Breakfast Table." As a writer of songs and lyrics, both humorous and

serious, Dr. Holmes stands in the first rank; many of his best poems are of this class, and have been written for social or festive occasions at which they have been recited or sung by the poet himself. Of patriotic lyrics few are likely to have a longer life than his stirring verses to "Old Ironsides," and his "Last Leaf" is one of the most famous of those rare poems in which humor and pathos are successfully blended. He is also popular as a lyceum lecturer. He has distinguished himself by his researches in auscultation and microscopy. In 1838 he published three "Boylston Prize Dissertations;" in 1842, "Lectures on Homœopathy and its Kindred Delusions;" in 1848, a "Report on Medical Literature," in the "Transactions of the National Medical Society;" a pamphlet on "Puerperal Fever;" and, in conjunction with Dr. Jacob Bigelow, an edition of Hall's "Theory and Practice of Medicine" (8vo, 1839). His later works are: "Currents and Countercurrents in Medical Science" (1861); "Elsie Venner, a Romance of Destiny" (2 vols., 1861); "Songs in Many Keys" (1864); "Soundings from the Atlantic" (1864); "The Guardian Angel" (1868); and "Mechanism in Thought and Morals" (1870).

HOLOTHURIANS. See SEA CUCUMBER.

HOLST, Hans Peder, a Danish poet, born in Copenhagen in 1811. He received a superior education, and became in 1836 professor of Danish and of logic at the military academy of Copenhagen. His works include *Nytaarsgave* (4 vols., Copenhagen, 1835-'8), *Dansk Leesebog* (1837-'9; 5th ed., 1857), and the poems *Mindeblatt om Kong Frederik VI.* (1839), and *Farevel*, in honor of the same sovereign (1840), which have been translated into many languages. He has also published novels and translations from German and French.

HOLSTEIN (Lat. *Holsatia*), a former duchy of Denmark, and a state of the Germanic confederation, now part of Schleswig-Holstein, a province of Prussia. Of the history of Holstein until its union with Schleswig little is known. It is probable that the great migration of the Cimbri extended as far north as Holstein. It is known that Tiberius Cæsar penetrated in the following century to the mouth of the Elbe. Tacitus seems to indicate that the seven small German tribes which worshipped the goddess Hertha inhabited the coasts of the Baltic as far as Mecklenburg and Schleswig. Of the names of these tribes, that of the Angles exists in the county of Angeln in Schleswig, and that of the Varini in the towns of Warnow and Warnemünde, in Mecklenburg; all the other names disappear in the consolidation of tribes under the name of Saxons, who are mentioned for the first time by the geographer Ptolemy. (See SAXONS.) Angles, Saxons, Jutlanders, and Frisians appear together in the great emigration to Britain during the 5th century. The Saxons in Holstein were subsequently designated as North Albingians (from *Albis*, Elbe), and the country

was known during the middle ages as North Albingia, or *Saxonia Transalbianna*. They were subjugated by Charlemagne, who obtained in 811, by a treaty with Hemming, king of the Danes, the whole of Holstein as far as the Eider. His son Louis le Débonnaire founded in 834 the archbishopric of Hamburg, and gave it to Ansgar, the apostle of the north; but in 854 it was consolidated with the bishopric of Bremen. Christian civilization made however little progress in Holstein. The country was for many years harassed by Danish invaders, until Henry I. of Germany succeeded in restoring the ancient boundary between the Eider and the Schlei (934). Conrad II. ceded the territory between the two rivers to the Danish king Canute the Great in 1027, and the Eider remained from that time the northern line of demarkation. Holstein continued to be part of the duchy of Saxony, and to be ruled by Saxon vice counts, until Duke (subsequently Emperor) Lothaire invested with it in 1106 Count Adolphus I. of Schauenburg. Adolphus II. (died in 1164) conquered Wagria, and Adolphus III. Ditmarsh; but the latter was taken prisoner by the Danes, and was compelled to cede Holstein to Waldemar II. Adolphus IV. reconquered it in 1225, and divided it between his two sons. After their death arose five lines, of which the line Segeberg became extinct in 1308, Kiel in 1321, Plön in 1390, and Rendsburg in 1459. The Schauenburg line, which continued till 1640, possessed only part of Stomarn, the so-called domain of Pinneberg. Mechthild, daughter of Adolphus IV., married in 1237 Duke Abel of Schleswig, who was subsequently king of Denmark (1250-'52). The Danish crown fell after his death to another house, and his heirs were engaged in numerous conflicts for the possession of the duchy of Schleswig, and received great assistance from their relatives, the counts of Holstein. Denmark fell into anarchy, and Gerhard, of the Rendsburg line, ruled it from 1334 to 1340, and obtained Schleswig as a hereditary fief. His sons were not able to retain the regal power, and Denmark was reconstructed by Waldemar IV. Some portions of Schleswig remained the property of the counts of Holstein, who took possession of the whole duchy in 1375, at the death of Duke Henry, the last descendant of Abel, and obtained it in August, 1386, by treaty at Nyborg in Finen, as a hereditary fief, and Gerhard VI., of the Rendsburg line, was invested with it. The history of Holstein from this time is included in that of Schleswig. (See SCHLESWIG-HOLSTEIN.)

HOLSTON, a river formed by the junction at Kingsport, Tenn., of the N. and S. forks, which rise in the Alleghany mountain in S. W. Virginia. It flows S. W., passing by Knoxville, and, after a course of about 200 m., joins the Clinch, near Kingston, Roane co., to form the Tennessee. It is navigated by steamboats at all seasons to Knoxville, and during the winter to Kingsport. The principal tributaries are the French Broad and the Little Ten-

nessee, which rise in the Blue Ridge mountains in western North Carolina. The former joins the main stream near Knoxville, and is navigable to Dandridge, Jefferson co.

HOLT. I. A N. county of Nebraska, separated from Dakota by the Niobrara river, and watered by the Elkhorn; area, about 2,100 sq. m. It is not included in the census of 1870. II. A N. W. county of Missouri, separated from Kansas and Nebraska on the S., S. W., and W. by the Missouri river, and bounded E. by the Nodaway; area, 470 sq. m.; pop. in 1870, 11,652, of whom 184 were colored. It has an undulating surface, with some bluffs on the Missouri river, and a fertile soil. The Kansas City, St. Joseph, and Council Bluffs railroad traverses it. The chief productions in 1870 were 71,421 bushels of wheat, 1,321,620 of Indian corn, 91,994 of oats, 61,402 of potatoes, and 155,100 lbs. of butter. There were 3,551 horses, 3,924 milch cows, 6,738 other cattle, 7,768 sheep, and 25,220 swine; 6 flour mills, 15 saw mills, and 4 manufactories of saddlery and harness. Capital, Oregon.

HOLT, Sir John, an English jurist, born at Thame, Oxfordshire, Dec. 30, 1642, died in March, 1709. He was educated at Oxford, became a student of law, was called to the bar in 1663, and rose to eminence as an advocate. In 1686 he was elected recorder of London, but was removed at the expiration of a year and a half in consequence of his opposition to the measures of the court. In the convention parliament which met to arrange the succession to the crown, after the departure of James II., he displayed so much ability that William III. appointed him in April, 1689, chief justice of the king's bench, which office he retained until his death. In 1700 he was solicited to accept the great seal, upon the removal of Lord Somers from the office of chancellor, but declined. Of his integrity, courage, and firmness in the discharge of his duties, a traditional instance is related upon the occasion of a summons from the commons to appear at their bar, for deciding in favor of the Aylesbury burgesses, who had been committed for complaining about the illegal rejection of their votes. He took no notice of the first message from the house; and upon being summoned by the speaker in person, he told that officer to return at once to his chair, or he would commit him to Newgate. The reports of his decisions, compiled by his pupil and successor, Chief Justice Raymond, commencing with the Easter term, 6 William and Mary, give a good impression of his judicial abilities. Sir John Holt published in 1708 a folio volume of crown cases collected by Chief Justice Kelyng, with notes and three of his own decisions.

HOLT, Joseph, an American statesman, born in Breckenridge co., Ky., Jan. 6, 1807. He was educated at St. Joseph's college, Bardstow, and at Centre college, Danville, and in 1828 began to practise law at Elizabethtown, Ky., whence in 1832 he removed to Louisville,

and in 1835 to Port Gibson, Miss. He returned to Louisville in 1842. In 1857 he was made commissioner of patents at Washington, and in 1859 became postmaster general under President Buchanan. In December, 1860, upon the withdrawal of John B. Floyd, he took temporary charge of the department of war. He afterward served in civil departments until September, 1862, when he was appointed judge advocate general of the army. He was brevetted as major general, March 13, 1865.

HÖLTY, Ludwig Heinrich Christoph, a German poet, born at Mariensee, near Hanover, Dec. 21, 1748, died in Hanover, Sept. 1, 1776. He studied theology at Göttingen, became acquainted with Bürger, Miller, and Count C. Stolberg, and was member of the society of poets which they had formed. He was preparing a collection of his poems when he died. They were afterward edited by his friends Stolberg and Voss in 1783, and again by Halm in 1869. He translated the philosophical works of the earl of Shaftesbury and other English works into German.

HOLTZENDORFF, Franz von, a German juriconsult, born at Vietmannsdorf, Prussia, Oct. 14, 1829. He studied law at Berlin, Heidelberg, and Bonn, was appointed in 1861 professor at Berlin, and in 1867 became a member of the North German parliament. Since 1861 he has edited the *Allgemeine deutsche Strafrechtszeitung*, since 1866 in conjunction with Virchow the *Sammlung gemeinverständlicher wissenschaftlicher Vorträge*, and since 1871 the *Jahrbuch für Gesetzgebung, Verwaltung und Rechtspflege des Deutschen Reichs*. His most prominent works are: *Die Reform der Staatsanwaltschaft in Deutschland* (Berlin, 1864); *Kritische Untersuchungen über die Grundsätze und Ergebnisse des irischen Strafvollzugs* (1865); *Die Principien der Politik* (1869); *Encyclopädie der Rechtswissenschaft* (1870 et seq.); and *Handbuch des deutschen Strafrechts* (1874 et seq.). He is the founder of several philanthropical societies, and an active promoter of public education.

HOLY ALLIANCE, a league formed by the emperors Alexander I. of Russia and Francis of Austria, and King Frederick William III. of Prussia, Sept. 26, 1815, after the second abdication of Napoleon, and acceded to by the other principal powers of Europe, except Rome, England, and France. Its ostensible object was to regulate the states of Christendom on principles of Christian amity, but the real aim was to maintain the existing dynasties. Alexander himself drew up the agreement and gave to it its name. The three monarchs signed it at Paris, Sept. 26, 1815, but it was not wholly made public till Feb. 2, 1816, when it appeared in full in the "Frankfort Journal." A special article of the treaty excluded for ever the members of the Bonaparte family from all the thrones of Europe. It was in virtue of the holy alliance that Austria in 1821 suppressed the revolutions in Naples and Piedmont, and

that France in 1823 restored absolutism in Spain. After Alexander's death the compact lost authority, and the French revolution of 1830 may be said to have ended it.

HOLYHEAD (Welsh, *Caer Gybi*, fort of Gybi), a parliamentary borough, market town, and seaport of N. Wales, on a small island of the same name at the W. extremity of the county of Anglesea, 67 m. W. of Liverpool; pop. in 1871, 6,193. An embankment three fourths of a mile in length, 16 ft. high, with a bridge midway, under which the tide rushes with great violence, connects the island across a sandy shallow with the island of Anglesea. The island of Holyhead is mostly a barren rock, ending in a huge headland of serpentine, and is noted for its magnificent caverns excavated by the sea. The town is irregularly built, but the houses are massively constructed of stone.

A harbor of refuge has been formed by a north breakwater 7,860 ft. long and an east breakwater 2,000 ft. long, the completion and formal opening of which, after 25 years' labor, was celebrated Aug. 23, 1873. The north breakwater is terminated by a head on which is erected a lighthouse. The harbor and roadstead cover about 667 acres. The foundation of the work is a great mound of rubble stone, 400 ft. wide at the base, and nowhere less than 250 ft. in width at low-water level. It contains altogether about 7,000,000 tons of stone. The superstructure is a solid central wall of masonry built of stone from the Holyhead mountain quarries. The inhabitants are mostly engaged in rope making, ship building, and the coasting trade. The parish church is an ancient structure, dedicated to St. Gybi, with some rude but curious carving



New Harbor of Refuge at Holyhead.

on its walls, and situated in a churchyard surrounded by a stone fence which appears to have been a Roman fortress. Holyhead is a terminus of the Chester and Holyhead railway. A submarine telegraph extends across the channel from Holyhead to Howth, and on account of its advantageous situation Holyhead has been made the principal station of the post-office packets to Dublin.

HOLYOAKE, George Jacob, an English reformer, born in Birmingham, April 13, 1817. He studied and afterward taught mathematics in the mechanics' institute of that city, and became known as an advocate of political and religious radicalism. Among his numerous publications is a "History of Coöperation in Rochdale," describing the benefits of the pioneer society founded in that town in 1844, which has been translated into many languages. He

has edited for many years "The Reasoner," an organ of secularism, as he calls the system of civilization based upon secular and not upon theological ideas. This system is defined by its advocates as the religion of the present life, not in opposition to theology, but apart from it. It teaches that intelligent sincerity is sinless; that we should believe nothing until compelled to believe it by positive demonstration; that the performance of duty, not the pursuit of happiness, is the end of life; and that utility, broadly and unselfishly considered, is the test of right. It advocates free thought and free criticism, and makes the quality of thought, not its motive, the subject of discussion. It avoids theology on the ground that its truth or falsity can only be demonstrated after death. In its practical bearing it seeks for "that material condition in which it shall be impossible

for man to be depraved or poor," and professes to furnish for those who cannot accept Christianity a rule of conduct, drawn from the wisdom of science and experience, which shall enable them to live purely, act nobly, and deserve another life (if there be one) by the unfaltering pursuit of duty in this. Holyoke was under arrest for some time on a charge of atheism, and is said to have been the last person committed for that offence. He was indicted for publishing unstamped papers, and had incurred fines to an immense amount when the duty was repealed in 1855. His "History of Coöperation" (2 vols., London) was published in 1874.

HOLYOKE, a city of Hampden co., Massachusetts, on the W. bank of the Connecticut river, 7 m. N. of Springfield and 80 m. W. by S. of Boston; pop. in 1850, 3,245; in 1860, 4,997; in 1870, 10,733, of whom 5,490 were foreigners. It is regularly laid out on high ground, is divided into seven wards, and is lighted with gas and supplied with water from Ashley pond. The Connecticut River railroad and a branch of the New Haven and Northampton line pass through the city. Its prosperity dates from the construction in 1849 by the Hadley Falls company, now the Holyoke water power company, of a dam across the Connecticut, which here falls 60 ft. in three fourths of a mile. (See DAM.) The principal manufactures are of cotton and woollen goods and of paper, the latter being the most important. There are 16 paper mills, with capacity for 50 tons a day, of which 8 manufacture writing paper and the rest collar, blotting, and wrapping paper; 7 cotton mills, with 136,000 spindles, producing spool cotton, twine, thread, yarn, cottonades, ginghams, dress goods, sheetings, shirtings, drills, lawns, &c.; and 6 woollen mills with 29 sets of machinery, manufacturing beavers, cassimeres, doeskins, and horse blankets. There are also a shoddy mill, a manufactory of flocks, two machine shops, a screw mill, a flour mill, three lumber mills, and two national banks with a capital of \$400,000. The assessed value of property in 1873 was \$8,578,192. The city has 31 public schools, having 44 teachers and an average attendance of 1,221 pupils in 1872; a weekly newspaper, and 8 churches.—Holyoke was originally a part of Springfield. It was incorporated as a part of West Springfield in 1786, receiving the name of Ireland parish, and became a separate town in 1850. It received a city charter in 1873.

HOLYOKE, *Edward Augustus*, an American centennarian, born in Essex co., Mass., Aug. 1, 1728, died in Salem, Mass., March 31, 1829. He graduated at Harvard college, of which his father, Edward Holyoke, was president, in 1746, and began to practise as a physician at Salem in 1749. At his death he had practised in Salem for 79 years, and had never been 50 miles from that city. He was married in 1755, and a second time in 1759, and was the father of 12 children, only two of whom survived him. He was the first president of the Mas-

sachusetts medical society. He was temperate in his diet, eating freely of fruit; was accustomed to walk in his professional practice until his 80th year; and regarded his constant care to have a full proportion of sleep as one of the causes of his longevity. At 80 years of age he had lost his teeth, and his hearing and memory had begun to fail. Between the ages of 45 and 85 his sight required the aid of convex glasses; it gradually improved afterward, till at his death he could read the finest print with his naked eyes. On his 100th birthday about 50 physicians of Boston and Salem gave him a public dinner, when he appeared at the table with a firm step, smoked his pipe, and gave an appropriate toast. A memoir of his life was published by the Essex medical society.

HOLYROOD PALACE. See EDINBURGH.

HOLY SPIRIT PLANT, a name which, as well as dove plant, has been given to a Central American orchid, *peristeria elata*, which has



Holy Spirit or Dove Plant (*Peristeria elata*).

large, green, egg-shaped pseudo-bulbs, strongly ribbed leaves 3 ft. or more long, and a flower stem 5 or 6 ft. high, which bears upon its upper portion numerous, nearly globose, white, fragrant flowers. The structure of the flowers in the orchids is quite unlike that with which most persons are familiar; it is sufficient to say here that the stamen or stamens and pistil are curiously united into what is called the column, and refer the reader to ORCHIDS for further description. In many of this family the petals and sepals present the most grotesque and irregular forms, often simulating the appearance of insects; in *peristeria*, however, the envelopes of the flower are unusually regular and form an almost spherical case of alabaster whiteness, within which is enclosed a delicate little bird with outspread wings. The column in this plant bears so strong a resemblance to a bird as to require scarcely any effort of the fancy to make it appear like a

dove, of the form which artists choose in typifying the Holy Spirit. It is not surprising that a plant which to the educated eye is so striking should, to the ignorant and superstitious among the Spanish Americans, appear of some supernatural significance, and be regarded with veneration. Under the name of *el Spirito Santo* it is employed in religious festivals in Central America. At the time when the current of travel to California was by the way of Panama, living plants, as well as the flowers preserved in alcohol, were frequently brought home by passengers. It is now not rare in the collections of those who cultivate orchids, though it is not often seen in cultivation with the size and vigor of the plant in its native country.

HOLY WEEK, the last week of Lent, immediately preceding Easter Sunday. It is sometimes called Passion week, but that denomination is given in the Latin and Greek churches to the week preceding Palm Sunday, and commencing with Passion Sunday. The term holy is applied to it because it is commemorative of Christ's death for the redemption of mankind. It was called in the early Christian ages the great week, both because of the mighty event it commemorates, and because it is observed with the greatest solemnity and strictness. Tertullian, Lactantius, and Chrysostom, among other ancient writers, mention the fact that during this week Christians were wont to fast on one meal of bread, salt, and water, taken in the evening, while many abstained from all food the entire week, and a still greater number took no nourishment during Good Friday and Holy Saturday. In the middle ages it was called the authentic week; and in Germany, Denmark, and the Scandinavian peninsula it is known as still week. The greater number of Protestant churches do not solemnize this week. The Lutheran churches, the church of England, and the Protestant Episcopal church have special services each day. In the Greek and other eastern churches the observances and ceremonial are substantially the same as in the Latin. It commences with Palm Sunday, when the blessing of palm branches or other evergreens, and the distribution of them to the people who carry them in procession, are designed to recall the circumstances attending Christ's triumphant entrance into Jerusalem. On Wednesday, Thursday, and Friday evenings the office of *Tenebræ* (darkness, from the darkening of the churches) is chanted. It consists of the matins and lauds for the following mornings, which it is customary to recite over night. During this office a large candlestick is placed near the altar, bearing 15 tapers disposed in the form of a triangle, and representing the light of Christ and of the prophets who had announced his coming. As the psalms are sung, the tapers are extinguished, until only the topmost remains. This, as it represents Christ, is taken down and carried behind the altar during the *Miserere*, after which it is put back in its place, to signify the temporary

extinction of the light of Christ between his death and resurrection. Thursday, being the anniversary of the institution of the eucharist and of the priesthood of the new law, is distinguished by two ceremonies of great significance which take place at the solemn mass in cathedral churches: the consecration by the bishop assisted by 12 priests, in full sacerdotal costume, of the oils used in the administration of the sacraments, &c., and the washing of feet. At the end of mass, and after the procession, the celebrant washes the feet of 12 poor persons, while the choir sings the words of St. John, *Mandatum novum do vobis*, "A new commandment I give unto you," &c. Hence the name of Maundy Thursday by which this day is still known. In Rome the pope washes the feet of 13 poor priests, in memory of the body of the apostles raised to that number by the extraordinary calling of St. Paul. During the *Gloria in excelsis* of the mass of Thursday, all the bells are rung, and thenceforward remain silent until the *Gloria in excelsis* in the mass of Holy Saturday. A large host, consecrated during this mass, is carried in procession at the end of it to a side altar (called the sepulchre) richly decorated, on which it remains and where it is visited by the faithful during the whole of the ensuing day. On Good Friday the altar is denuded to signify the desolation of the church, the prophecies are sung which pertain to the story of Christ's suffering, the whole body of the faithful perform what is called the adoration of the cross, the passion according to St. John is chanted, and all proceed in silence to the sepulchre, whence the consecrated host is brought back in procession, offered in adoration to the people, and consumed by the celebrant. This is called the "mass of the pre-sanctified" or preconsecrated elements, no consecration taking place on that day. On Saturday the services begin by the blessing of the "new fire" obtained from flint and steel, because our true vital light and warmth come from Christ, our Rock; the blessing of the paschal candle, an emblem of Christ arisen; the chanting of all the prophetic passages of the Old Testament pointing to Christ's resurrection; then the benediction of the baptismal fonts, from which the clergy return in procession, singing the litany of the saints, and the joyous mass with its Alleluias, a foretaste of the resurrection.

HOLYWELL, a municipal and parliamentary borough and market town of Flintshire, N. Wales, near the left bank of the estuary of the Dee, and on the Chester and Holyhead railway, 15 m. N. W. of Chester; pop. in 1871, 5,335. It takes its name from the holy well of St. Winifred, formerly celebrated for its virtue in the cure of diseases. The well discharges 21 tons of water per minute, and now serves as the motive power of most of the machinery in the place. Margaret, countess of Richmond, mother of Henry VII., erected a handsome

Gothic building over the spring, the upper part of which is now used as a school house. In the vicinity are collieries, and valuable mines of lead, copper, and zinc. The chief manufactures are copper wire, bolts, nails, sheathing, white and red lead, shot, flour, and flannels. Limestone is largely exported.

HOMBURG (Ger. also *Homburg vor der Höhe*, at the height), a town of Prussia, capital of the circle of Upper Tannus in the province of Hesse-Nassau, 9 m. N. N. W. of Frankfort; pop. in 1871, 8,626. It derives its name from being situated on and near the heights of the mountain ridge of Tannus. The principal buildings are a castle, built in 1680 and renovated in 1835, a library, a picture gallery, and a Protestant church. The town is a celebrated watering place, but owes much of its reputation to the former existence of an authorized gambling house. The government of the landgraviate concluded in 1840 a contract with the brothers Louis and François Blanc of Paris, permitting them to keep open bank, in return for building a *Kursaal* at a cost of \$100,000, and a high annual rent. At the expiration of the contract in 1870 the Prussian government refused to renew it and prohibited the further existence of gambling houses. There are four ferruginous and two saline springs, which contain more carbonic acid than any other mineral water known. (See **HESSE-HOMBURG**.)

HOME, Daniel Dunglas, an English spiritualist, born near Edinburgh, March 20, 1833. He was adopted by an aunt, with whom he came to America when nine years of age. It is said that spiritual manifestations attended him from his infancy, but the earliest of his own recollection was a remarkable vision in his 14th year of a deceased playmate. When 17 years old he became publicly known as a medium, though against the wishes of his family. He resided at different times in Troy and Newburgh, N. Y., in Lebanon, Conn., and in Springfield, Mass., in the last place many remarkable manifestations taking place. These manifestations have continued with intermissions to attend Mr. Home to the present time. Besides the ordinary phenomena of rapping, table-tipping, writing, and playing upon musical instruments, they include in his case, it is affirmed, visions seen by the medium, appearances of hands, arms, and spirit forms, seen by other persons, "levitation," or the preternatural uplifting of the medium, elongation and shortening of his body by several inches, and his handling of fire and heated objects without hurt. The occasional intermission of his power is without any known cause, and its occurrence has been generally beneficial to his physical health. He claims to have performed some remarkable cures, and to have been himself protected from sudden danger. The manifestations have been witnessed by many persons, and contradictory accounts of them have been published by different and reputable witnesses.

In 1853 he went to New York to study medicine, but abandoned the intention. In 1855 he went to England, and has since made London his principal residence. He visited many parts of Europe, and was presented to the emperors of France and Russia, and to the pope. In 1856, while in Rome, he united with the Roman Catholic church. He subsequently met in Rome a Russian lady of noble birth, whom he married in St. Petersburg in 1858. She died in southern France, where they were staying for her health, in 1862, leaving him a son born in 1859. Memorial sketches of her were written by Mary Howitt and Mrs. S. C. Hall. In 1864 he was expelled for spiritualist practices from the city of Rome by the papal authorities. In 1866 he became secretary of the spiritual athenæum, a society in London for the extension of spiritualism. In the same year he became acquainted with Mrs. Jane Lyon, who conveyed to him by gift and bequest large sums of money, including the bulk of her property. Subsequently she sued for its recovery, and it was restored to her by law. In 1871 Mr. Home again married a Russian lady of rank. He has published an autobiographical work on spiritual manifestations, entitled "Incidents of my Life" (London, 1862, and republished in New York and Paris), and a second volume with the same title (London and New York, 1872). A third volume is announced.

HOME, Sir Everard, a Scottish surgeon, born at Greenlaw castle, Berwickshire, May 6, 1756, died Aug. 31, 1832. He studied medicine with his brother-law, the celebrated John Hunter, and practised in London for more than 40 years. In 1813 he was created a baronet and appointed sergeant surgeon to the court, in which office he was continued by William IV. He was also professor of surgery and anatomy, and for many years president of the royal college of surgeons. His "Lectures on Comparative Anatomy" (6 vols. 4to, London, 1814-'28) is his most important work. He is indebted for his reputation as an author to the folio volumes of minutes of dissections left by John Hunter, which he took from the Hunterian museum under the pretence of preparing a catalogue of the museum, and burned.

HOME, Henry, Lord Kames. See **KAMES**.

HOME, or Hume, John, a Scottish author, born at Anerum about 1722, died in Edinburgh, Sept. 5, 1808. He was educated at the university of Edinburgh, and after a course of theological studies was licensed to preach in April, 1745. Upon the outbreak of the rebellion in 1745 he took up arms on the Hanoverian side. He was taken prisoner at Falkirk in 1746; but having effected his escape, he resumed his professional studies, and in the latter part of the year was presented to the parish of Athelstaneford. He gave much time to historical reading and dramatic composition, and in 1749 went to London with a tragedy entitled "Agis," which Garrick, then manager

of Drury Lane, declined to accept. Although mortified by his ill success, he set about the composition of another tragedy, "Douglas," founded on the old ballad of "Gil Morrice," which, upon being presented to Garrick in 1755, was likewise refused. It was produced at Edinburgh in December, 1756, with great success; but so violent a storm was raised by the fact that a minister of the church of Scotland had written a play, that Home was threatened with deposition, to avoid which he resigned his living in June, 1757. He removed to London in the same year, when "Douglas" was brought out at Drury Lane with complete success. By the aid of the sinecure office of conservator of Scots privileges at Campvere, presented to him by the earl of Bute, and of a pension of £300 from George III., he passed the remainder of his long life in affluence, the last 40 years in Scotland. He wrote four other tragedies, "The Fatal Discovery," "Alonzo," "Alfred," and "Aquilaia." His literary reputation rests upon his "Douglas," which is still performed, notwithstanding the declaration of Garrick that it was totally unfit for the stage. He also wrote a "History of the Rebellion of 1745" (4to, London, 1802). His complete works, with an account of his life and writings, were published by Henry Mackenzie (3 vols. 8vo, Edinburgh, 1822).

HOMER (Ὅμηρος), the supposed author of the *Iliad* and *Odyssey*, the earliest monuments of Greek literature. The several ancient biographies of Homer extant are either legendary or conjectural, and often contradictory, and the narratives of the poems are full of extraordinary incidents, in great part of a mythological character, and of striking discrepancies. Hence various opinions are entertained as to the origin of the poems and the amount of fact or fiction contained in them. G. Curtius, following Müllenhoff, conjectures that Homer was a name given to the ideal patron of an association of poets (δμηροί). In common use the word δμηρος meant hostage, but Düntzer and others suppose that its original meaning was "one who connects or combines," analogous to that of Vyasa (collector), the name given to the compiler or compilers of the Hindoo Vedas and Puranas. Sengebusch identifies it with the name of Thamyris, the Thracian bard. It is noteworthy that the name is repeatedly spoken of by ancient writers as only a pseudonym of the poet. Either Homer was himself the "hostage," sent to Chios or Colophon, or it was his father who was surrendered to the Persians. On the island of Ios the name was explained as "follower," supposing that he followed the Lydians when they were compelled to move away from Smyrna. Suidas gives it the signification of "counsellor," and Ephorus dismembers it into ὁ μὴ ὁρῶν, "one who does not see," referring to the legend of the poet's blindness. It does not appear, however, that any of these interpretations can furnish a clue to the problem whether it is really

the name of a person, and whether that person was the author of the *Iliad* and *Odyssey*.—Two biographies of Homer have come down to us from antiquity, one of which is attributed to Herodotus and the other to Plutarch. Both have been pronounced forgeries, yet it is probable that they contain the legends relating to the life of the poet current in ancient times. His mother is said to have been Critheis; and one legend represents him to have been born on the bank of the river Meles, near Smyrna, whence the name Melesigenes; according to another, Critheis was married to Mæon, king of the Lydians, who brought up her son (the offspring of a dæmon or genius) as his own, whence the name Mæonides. Another legend relates that Homer became a schoolmaster and poet in Smyrna; that he was induced by Mentès, a foreign merchant, to travel; that while visiting Ithaca he was attacked by a disease in the eyes, which resulted in total blindness; that he composed verses, which he recited wherever he went; that Thestorides, a schoolmaster of Phocæa, carried a copy of Homer's poetry to Chios, and recited it as his own; that Homer followed him thither, and resided long at Bolissos, a town in Chios; and finally, that he died on the little island of Ios, when journeying to Athens. Still another legend declares that the poet on his way to Thebes landed at Ios, and there died of vexation at being unable to solve a riddle propounded to him by some young fishermen, in answer to his question if they had got anything. "As many as we caught," said they, "we left; as many as we did not catch, we carry." The prevailing opinion of antiquity seems to have been that Homer was born in Smyrna, resided for a long time in Chios, and was buried in Ios. Rhodes also is said to have been his home, but without evidence. In later times the island of Cyprus also made such a claim. The Cypriotes said that Homer was born in a field near Salamis, of a girl named Themisto, and that the birth of the great singer had long previously been announced by the Salamine oracles, in verses which they could produce. Athens, Argos, Pylos, and other cities wished likewise to be regarded as Homer's native place. Herodotus places Homer about 400 years before his own time, or in the second half of the 9th century B. C., which is 400 years after the time which he fixes for the Trojan war. The dates assigned to Homer by other ancient writers range from the beginning of the 12th to the beginning of the 7th century B. C.—The principal poems ascribed to Homer are the *Iliad* and the *Odyssey*. Among the minor, and evidently of different origin, are the so-called Homeric hymns and the *Batrachomyomachia*. The *Iliad* comprises a period of about 50 days of the 10th year of the Trojan war, and narrates the wrath of Achilles and its consequences as far as the death of Hector. Achilles is enraged because Briseis, who had been allotted to him, was taken away and given to Agamemnon; and,

angered with all the Greeks, he no longer takes part in the battles with the Trojans. But the misfortunes of his comrades touch his heart, and he at length permits his friend Patroclus to borrow his armor and go out to battle at the head of his Myrmidons. Patroclus is slain by Hector. This event is the central and turning point of the whole epic. The progress toward it is very gradual and artistic. The cause of the anger is told first. Then, while Achilles is lying in his tent, several scenes of battle are described, which afford an opportunity for introducing the principal heroes of the Greeks, and especially for bringing Diomedes into prominence. The fruitlessness of their efforts and valor heightens their desire for the aid of Achilles. This furnishes the opportunity for introducing and praising the hero. At last he comes. He has suppressed his anger against the Greeks, and turned it against the Trojans, who have killed his friend. He turns the fortunes of war, and avenges the death of Patroclus by slaying Hector. This portion of the poem has a rapid movement. But Hector's death does not end the Iliad. His body is given up to the Trojans and interred, and Achilles' wrath is turned to pity for Priam, the aged father of the dead hero; and the poem is thus brought to a peaceful conclusion. The Odyssey describes the return of Ulysses (Odysseus) to his island home. It is a story of 40 days; but within this short period is compressed a mass of events. It is composed of four main divisions. In the first Ulysses dwells with Calypso on the isle of Ogygia, far from his home, where the suitors of his wife Penelope threaten the ruin of his fortune. Telemachus, his son, now on the threshold of manhood, resolves to oppose their designs, and, counselled by Minerva, undertakes a journey to Pylos and Sparta to seek his father. In the second part Ulysses leaves Ogygia, arrives in the land of the Phæacians, to whom he narrates his adventures, and goes to Ithaca. The third part details the plan of vengeance which Ulysses and his son resolved upon in the house of a faithful servant, the shepherd Eumæus, and which is executed in the fourth and last division. The Odyssey, like the Iliad, is centred in one person and one event—Ulysses and his return and vengeance. Its action, however, is more complicated, through Telemachus's journey.—Two views are held by modern scholars on the nature of the contents of the Iliad and Odyssey. One is that the destruction of Troy (Ilium) was an actual historical event, which took place either before the Æolian migration, or in connection with it. The first to give a scientific basis to this view was Völcker, in *Die Wanderungen der aiolischen Kolonien nach Asien als Veranlassung und Grundlage der Geschichte des trojanischen Krieges* (1831). The other, which has found a defender in E. Curtius, makes the narrative of the Iliad not that of the legendary destruction of a certain town, but the recollection of the deeds of the

Achæans, who were descendants of Pelops, Agamemnon, and Achilles, who contended with the Dardanians, from whom they conquered a new territory. Blackie, a recent and strenuous advocate of the traditional theory, in his "Homer and the Iliad" (1866), expresses his belief "that there was a kingdom of Priam, wealthy and powerful, on the coast of the Dardanelles; that there was a great naval expedition undertaken against this Asiatic dynasty by the combined forces of the European Greeks and some of the Asiatic islanders, under the leadership of the king of Mycenæ; that there was a real Achilles, chief of a warlike clan in the Thessalian Phthiotis, and a real quarrel between him and the general-in-chief of the Hellenic armament; that this quarrel brought about the most disastrous results to the Greek host, in the first place, and had nearly caused the failure of the expedition; but that afterward, a reconciliation having been effected, a series of brilliant achievements followed, which issued soon after in the capture of the great Asiatic capital." Bishop Thirlwall in his "History of Greece" rejects all belief in the detailed narratives of the Iliad and the Odyssey, while he affirms that "the incidents cursorily noticed in these poems were exhibited in full mythical garb in other epics." Grote says in regard to the Trojan war that, "as the possibility of it cannot be denied, so neither can the reality of it be affirmed." Max Müller says that "it would be mere waste of time to construct out of such elements a systematic history, only to be destroyed again sooner or later by some Niebuhr, Grote, or Lewis." The theory in his "Lectures on the Science of Language," second series (1864), that "the siege of Greece" (1874) the subject is treated in the same spirit. While the Trojan war is thus divested of all historical character, Gladstone reiterates in his "Juventus Mundi" (1869) what he said in his "Studies on Homer and the Homeric Age" (1858), namely, that the Iliad and the Odyssey are emphatically historical poems; and in his "Homer's Place in History" (1874), building on Egyptological researches, as Chabas's chapter on *Les nations connues aux Égyptiens en l'antiquité historique* (1873), and Lenormant's *Les premières civilisations* (1874), he thinks there is room for the presumption that the capture of Troy occurred in the 14th century B. C. For the attempts made to identify the site of Troy, including the recent excavations by Dr. Schliemann, see Troy.—The discussion of the origin of the Homeric poems turns principally on the theory which, since the publication of Wolf's famous *Prolegomena* (1795), is known as the Wolfian theory. It maintains that the Iliad is made up

of a number of songs which first existed as detached poems, handed down from generation to generation by a school of rhapsodists or professional minstrels; the poems were thus not the work of one man, and possibly not the product of any one age—a conclusion grounded partly on the absence of writing until long after the time when these poems first came into existence, and partly on the contradictions of the poems themselves. This opinion had to some extent been entertained before Wolf by Vico, Casaubon, Perrault, Hedelin, Bentley, Wood, and other scholars; but their views were outweighed by the current opinion of Homer's personality. Since the day of Wolf the question has been amply discussed by the greatest scholars of all lands, but without resulting in a definite conclusion. In 1866 F. A. Paley attempted to prove that the Greek lyric, tragic, and comic poets either knew nothing or exceedingly little of our Iliad and Odyssey, or at least preferred to draw their material from other poems. Some hold that, in order to prove that these poems have from the first been known in their entirety, and that therefore the Greeks had only one Homer, it must be shown that they were from the first written poems. Barthélemy Saint-Hilaire, in his recent *Iliade d'Homère traduite en vers français*, attempts to establish that the Homeric age possessed the art of writing; but against this opinion it has been argued that facilities for writing would lead rather to the rise of contemporary chroniclers than to the practice of writing down poems. Many historians doubt therefore that poems were written centuries before the time of Herodotus, and also that the Greeks had any written literature before the Persian wars. Paley has expressed his conviction that no such literature existed in the time of Pindar; and the subject has been further examined by Tennell, in a paper on "The First Ages of a written Greek Literature" ("Transactions of the Cambridge Philosophical Society," 1868). When people neither wrote nor read, the only way that poems could be made known was by recitation; and as it cannot be supposed that the whole of the Iliad and Odyssey could be recited on ordinary occasions, recourse is had to hypothesis. Poems were recited in historical times at Athens at the festival of the Panathenæa, and there were contests of rhapsodists at Sicily, Syracuse, Epidaurus, Orchomenus, Thebes, Acraphia, Chios, Teos, and Olympia. Such contests are alluded to in the Homeric account of the Thracian poet Thamyras, whom the muses struck blind at Dorium because he had boasted that he was able to contend even with them. It has therefore been supposed that such poems as the Iliad and Odyssey were recited at festivals by several rhapsodists in succession, and Nitzsch believes that such recitations lasted more than one day. But, as Ihne says, the subject of the rhapsodists is one of the most complicated and obscure of all.—Ancient wri-

ters agree in ascribing to Pisistratus the merit of having first committed the Homeric poems to writing, and an old Latin scholium, translated from the Greek of Tzetzes and discovered by Ritschl in a manuscript of Plautus at Rome, gives the names of Onomacritus, Zopyrus, Orpheus, and the corrupted name of Coneylus, as those of the four poets who assisted Pisistratus. It seems that before him Solon had undertaken to make such a compilation. The Alexandrian critics, however, do not even notice the Pisistratic recension among the many manuscripts of the Homeric poems which they had before them, and Payne Knight and others have inferred from their silence that they either did not possess it or esteemed it of no great authority; which could not have been the case if it had been, as is alleged, the prime originator of Homeric unity. There is evidence that the contemporaries of Pisistratus considered his labors valuable, and that from the Attic manuscript other cities, even Chios, had copies made. Besides that of Chios, Alexandria possessed manuscripts from Argos, Crete, Cyprus, Massilia, and Sinope; also another called *Αἰολική*, probably from a predominance of Æolic forms. Other copies were known by the names of the persons who made them, as the famous one made by Aristotle for Alexander the Great. An important epoch in the history of the Homeric poems opened in Alexandria, where they were revised by the most celebrated men of learning, as Zenodotus of Ephesus, Aristophanes of Byzantium, and above all by Aristarchus of Samothrace, whose recension is the most esteemed by modern critics, though all we have of it consists of short fragments scattered through scholia. Aristarchus's edition became the basis of all subsequent ones, and hence it may be accepted that, generally speaking, the text of the Homeric poems such as it has come down to us, and the division of each poem into 24 rhapsodies, are his work. Aristarchus was opposed in his criticisms and explanations by Crates of Mallus, the founder of the Pergamene school of grammar. The writings of Aristonicus, Didymus, Nicanor, and Hierodion seem to have been the sources of the Venetian scholia, published for the first time by Villoison in 1788, through which it was hoped to restore the edition of Aristarchus. The old editions of Homer, as well as the manuscripts, are of little value for the restoration of the text. The first printed edition appeared in 1488, but until the time of Wolf only about seven critical editions had been made. With Wolf's *Prolegomena*, published in 1795, prefixed to the second edition of his *Homeri et Homeridarum Opera*, begins the modern period of Homeric criticism. The advocates of the Wolfian theory infer from the history of the Homeric text that the original unconnected songs composing the Iliad and Odyssey were collected and combined by Pisistratus. The work of these critics consists in eliminating

from the Homeric text the spurious verses, and accounting for the probable causes of the interpolations. Those who believe in the original unity of the poems are, however, not unwilling to admit that in the long period of the preservation of the Homeric text numerous interpolations may have been made. These interpolations, as they are admitted by the conservative school, have been ranged in five groups in Kammer's work entitled *Die Einheit der Odyssee nach Widerlegung der Ansichten von Lachmann-Steinthal, Köchly, Hennings, und Kirchhoff dargestellt* (1873). The first group comprises those which carry out the original plan, but nevertheless modify it by additions and introductions of new themes; they are the largest of all, mostly found in the second part of the *Odyssey*, and in part have a high poetical value. The second group consists of those which extend the poem, but have little or no poetical value. The third are editorial interpolations which attempt to establish a stronger connection between a loose theme and the preceding portions by introducing preparatory verses; the fourth, interpolations which enlarge on certain scenes, and are probably due to the loquacity of rhapsodists, but are out of taste and poor in thought; the fifth, interpolations due to a thoughtless introduction of Homeric verses in a wrong connection. Grote supposes that the *Iliad* consisted originally of a comparatively small poem on the exploits of Achilles, which he calls the *Achilleid*, and that the other portions of the *Iliad* were not included in the first plan of it. He sums up the controversy with a statement which probably all critics of the Homeric poems are ready to accept: "For, in truth, our means of knowledge are so limited, that no man can produce arguments sufficiently cogent to contend against opposing preconceptions. . . . We have nothing to teach us the history of these poems except the poems themselves. Not only do we possess no collateral information respecting them or their authors, but we have no one to describe to us the age in which they originated; our knowledge respecting contemporary Homeric society is collected exclusively from the Homeric compositions themselves. We are ignorant whether any other or what other poems preceded them, or divided with them the public favor; nor have we anything better than conjecture to determine either the circumstances under which they were brought before the hearers, or the conditions which a bard of that day was required to satisfy."—Recent works on the grammar and vocabulary of the Homeric text are: Förstemann, *Bemerkungen über den Gebrauch des Artikels bei Homer* (Salzwedel, 1861); Buttmann, *Lexilogus, oder Beiträge zur griechischen Worterklärung, hauptsächlich für Homer und Hesiod* (2 vols., 5th ed., Berlin, 1864); Classen, *Beobachtungen für den homerischen Sprachgebrauch* (Frankfurt, 1867); Seiler, *Vollständiges Griechisch-Deutsches Wörterbuch über die Gedichte*

des Homeros und der Homeriden (7th ed., Leipsic, 1872). Critical works on questions connected with the origin and contents of the Homeric poems are: Nitzsch, *Die Sagenpoesie der Griechen* (Brunswick, 1852); Hoffmann, *Homericische Untersuchungen* (Clausthal, 1857-'9); Köchly, *De Iliadis Carminibus Dissertationes* (Zürich, 1857-'9), and *De Odysseæ Carminibus Dissertationes* (1862-'3); Kirchhoff, *Die homerische Odyssee und ihre Entstehung, Text und Erläuterungen* (Berlin, 1859); Bergk, *Emendationes Homericae* (Halle, 1859-61); Nägelsbach, *Homericische Theologie* (2d ed., Nuremberg, 1861), and *Anmerkungen zur Ilias* (3d ed., 1864); Bonitz, *Ueber den Ursprung homerischer Gedichte* (2d ed., Vienna, 1864); Lachmann, *Betrachtungen über Homers Ilias, mit Zusätzen von Moritz Haupt* (Berlin, 1865); La Roche, *Die homerische Textkritik im Alterthum* (Leipsic, 1866); Baletta, *Ὅμηρος Βίος καὶ Ποιήματα* (London, 1867); O. Meyer, *Quaestiones Homericae* (Bonn, 1868); Düntzer, *Die Homerischen Fragen* (Paderborn, 1874). Several of these works have been translated into English. As the Homeric poems are considered not only a principal source of the Grecian mythology, but also of the earliest history of the Greeks, and as their influence upon the general culture of that people was immense, they are fully discussed in the histories of Greece by Thirlwall, Grote, Curtius, and Cox; and also in works on the history of Greek literature, as those by Mure, K. O. Müller, and Nicolai. As poetical productions and models of the epic art, they have been treated and liberally borrowed from by eminent writers of all civilized nations. Among the best editions of the Homeric poems are those of Heyne, Wolf, and Bothe. More recent editions have been published by Bärleim (Leipsic, 1854), Sengebusch (Leipsic, 1855-'6), Bekker (Bonn, 1858), Charles Anthon (New York, 1858), Baumeister (Leipsic, 1860), Hoffmann (Clausthal, 1864), Ameis (Leipsic, 1865-'8), F. A. Paley (London, 1866), Hermann (Leipsic, 1866), Düntzer (Paderborn, 1866-'7), Faesi (Berlin, 1867), La Roche (Leipsic, 1867-'8), Hayman (London, 1867), G. Dindorf (Paris, 1868), and V. H. Koch (Hanover, 1868-'9). Among translations of Homeric poems may be mentioned those in German by Voss (first published in 1780, in constant demand; last ed., 1873), Uschner (Berlin, 1862), Ehrental (Hildburghausen, 1865), Carlowitz (Dresden, 1868), and Wiedasch (Stuttgart, 1869); in French by Dugas-Montbel (Paris, 1853), Bignan (1853), Personneux (1861), and Feillet (1865); in English by Chapman, Pope, Cowper, Munford (1846), Newman (1856), Worsley and Conington (1861-'5), Dean Alford (1861), Simcox (1865), Lord Derby (1865), Herschel (1866), Merivale (1869), and W. C. Bryant (1870-'71).

HOMESTEAD, the place where one's dwelling is. By this is meant the home itself, with the outbuildings connected with it, and a portion of the land, as the garden, and it may be some

fields, &c. From the nature of the case, where one occupies and uses in connection with his dwelling a considerable tract of land, the term homestead must be somewhat indefinite, and if employed in deeds or contracts, its precise meaning must be determined by the context and surrounding circumstances. Of late it has become common in the United States, by constitutional or statutory provisions, to exempt a homestead to a specified amount or value from attachment or sale for debt. Under these, if the debtor have more than the requisite amount or value lying in one body, he is usually permitted to make selection within the specified limits; but failing to do this, or if the circumstances present impediments, it will be done for him by the court in which proceedings to enforce debts against him are taken.

HOMICIDE, in criminal law, the killing of one human being by another. By the common law, it is not homicide to kill an infant before its birth, the authorities declaring that if one purposely kills a babe not yet born, it is only a misdemeanor and not a felony; but if the child is born alive and then dies from the previous injury, it is felony. So, if one intending to procure abortion does an act which causes a child to be born prematurely, and being so born, it dies because not mature enough to live, this is murder. But where a woman cut off the head of her child before it was wholly born, it was held not to be murder. The crime of child murder and wilful abortion is made punishable in many of our states by statute. Homicide is divided into three classes, justifiable, excusable, and felonious. Felonious homicide is either manslaughter or murder, which will be treated under those titles. In this article we shall speak only of homicide which is justifiable, and that which is excusable. These two are often confounded, and are sometimes spoken of as if they were the same thing, even in technical books of criminal law. But this is an inaccuracy. Justifiable homicide is that which is just and right, and not to be regretted; while excusable homicide is that for which excuses may be offered which take away wilful guilt from the killer; however much the act may be lamented. In this strict sense, there is perhaps no justifiable homicide except that which is committed officially and in the discharge of a legal duty; that is, there is no homicide strictly justifiable except the homicide by an executioner, or that of a public enemy in open war. If one, at great risk to himself, and in defence of the innocent, encounters and destroys an assassin, who could not otherwise be prevented from putting many to death and inflicting injuries worse than death, he may deserve and receive general applause. And the excuse extends much beyond those crimes which are punishable with death; because a man would be excused for putting an offender to death if that were the only way of preventing certain crimes which if committed might not be punished with death, such as rape, bur-

glary with arms, or robbery with arms. Again, the excuse in this case, as in that of self-defence, does not depend altogether upon the actual facts of the case, but much, and perhaps principally, upon the appearance of it to the person committing the homicide; for if, as a reasonable man, he was fully justified in believing that the peril from which he could deliver himself only by homicide was actual and imminent, the excuse is not taken away by proof that he was deceived. Thus, if one were attacked by an assailant threatening to shoot him with a pistol, and would be justified under the circumstances in killing his assailant if the pistol were loaded and the assailant intended to use it, and the assailed party had reason to believe this to be the case, his excuse would not be lessened by proof that the pistol was not loaded and his death not intended. The excuses for homicide sometimes mingle; thus one who is attacked by a murderer and cannot otherwise escape, may put him to death, either to prevent this felony, or to save his own life. But one who would escape the consequences of homicide by the excuse of self-defence, must be able to show that there was some overt act on the part of the assailant, and that the assailed was not moved by threats only, or merely by fears of what would be done, however just and rational they might be; but waited until some act took place to protect himself, not merely from fatal violence, but from grievous bodily injury. What this means is not plainly defined by the law; but it does not mean the injury caused by a blow from a fist or a stick, or a slight wound, which might be painful for a time, but from all effects of which the injured person would certainly and entirely recover within a few days. And here, too, as before, death must not be inflicted until nothing but this remains. That is, the party assailed must retreat as long and as far as he can retreat; must seek and use any refuge or means of escape open to him; and only when these are exhausted, or non-existent, can he put his assailant to death. It should however be stated, as a settled rule of law, that an assailed party, in danger of death or grievous harm, is bound to retreat only when he can do this with safety. For if retreat will only increase a danger already imminent, and give his assailant new power over him, he need not retreat at all, but may at once inflict death upon his assailant. So, too, homicide is excusable if inflicted as the only means of preventing a great crime. Here the law comes in with what may seem to be a definition; for it says that one may inflict death if there be no other way to prevent a felony. But the reader will see, under the title *FELONY*, that its meaning is quite undetermined; and there are things which are still called felonies, at least in England, of which we should be unwilling to say that they might lawfully be prevented by putting the offender to death. And yet it must be certain that the law would call this only excusable homicide, and not

justifiable. Excusable homicide is then that which is caused by self-defence, or the prevention of great crime, or accident. It is excusable by reason of self-defence, if it was strictly necessary for this purpose, and not otherwise. We believe that there is no rule of criminal law which ought to be more certain, and more universally acknowledged, than that homicide in self-defence must be grounded upon a strict and absolute necessity. It cannot be doubted that any one may save his own life by taking the life of his assailant; but it is equally certain, as matter of law, that he must not secure his safety by homicide provided he could secure it in any other way, as by retreating, or seeking refuge, or inflicting a less than fatal injury. We suppose that any difficulty which belongs to this subject must attend upon the application of these principles, and not upon the principles themselves. Thus, it is certain that the laws of England and of the United States agree in an absolute refusal to recognize the point of honor in cases of homicide. Juries, and possibly courts, may be influenced by it, perhaps unconsciously; but the law ignores it. If one attacks another with every form and method of insult, and the attacked party, finding no other way of stopping the insult, or escaping from it, puts the assailant to death, it is felonious and not excusable homicide. In reference to the excuse of accident also, it may be mingled with another. Thus, while one has no right to protect himself from slight bodily injury by putting his assailant to death, or to use that means of preventing wrongful conduct not of the gravest sort, yet he has a right to defend himself against any assault, and to protect himself from any injury, and to prevent any wrong doing. And if in all this he uses no weapons likely to produce death, and does not manifest by violence and excess a fatal purpose, he would be excused although the death of the wrong doer was the unintended result. Thus, one may turn a mere intruder out of his house, although he is quiet there, and, if necessary, put him out by force; but must not put him to death because he will not go out. But if, while using only such force as may seem necessary, he kills the intruder, he would be excused. In reference to this right of self-protection, the question has been raised whether the use of spring guns is lawful. It seems to be the law that one may use a spring gun to prevent felony, and that homicide caused by it would be excusable; but that it is not justifiable to use such instruments for protection against mere trespassers.

HOMMAIRE DE HELL, Ignace Xavier Morand, a French traveller, born at Altkirch, Nov. 24, 1812, died in Ispahan, Persia, Aug. 29, 1848. He studied at the college of Dijon and at the school of mines in St. Étienne, and after having been employed in railway surveys was in 1835 appointed by the Turkish government to make a scientific exploration of the region around Constantinople. In 1838

he was commissioned by the Russian government to explore the Crimea and the steppes of southern Russia. Ill health compelled him to return to France in 1842, when he presented to the academy of sciences a paper on the difference of level between the Caspian sea and the sea of Azov; and for his first volume of travels (Strasburg, 1844) he received the prize of the French geographical society. In 1845 he was commissioned by the French authorities to explore the Black and Caspian seas; and after having made in 1846 a survey of the former and subsequently explored the interior of Persia, he succumbed to illness at Teheran. The numerous geological specimens which he had collected were purchased by the French museum of natural history. The narrative of his later travels, *Voyage en Turquie et en Perse* (4 vols., Paris, 1854-'60), was published at the cost of the French government. The fourth volume, containing an account of his last journey, was edited by Jules Laurens, the painter, who was his travelling companion.—**ADÈLE**, his wife, born about 1820, accompanied him for five years, and assisted him in *Les steppes de la mer Caspienne* (3 vols., 1844-'7), contributing the picturesque descriptions and the sketches of manners, character, and physiognomy, and in his last work on Turkey and Persia. She also published in 1845 a volume of poetry, *Réveries d'un voyageur*; and in 1860 appeared her *Voyage dans les steppes de la mer Caspienne et dans la Russie méridionale* (2d ed., 1868).

HOMOCERICAL. See **HETEROECERICAL**.

HOMŒOPATHY (Gr. *ὁμοιος*, like, and *πάθειν*, to be affected), a system of medicine first definitely propounded by Hahnemann. (See **HAHNEMANN, SAMUEL**.) Its cardinal principle, from which it derives its name, is expressed in the aphorism, *Similia similibus curantur*, "Like cures like;" that is, the proper medicines to be administered in disease are those which produce similar symptoms in a healthy person. This principle had been partially enunciated by Hippocrates, the "father of medicine" (about 460 B. C.), who asserted that medicines sometimes acted according to the rule of *similia*, and at others according to that of *contraria*; thus intimating the truth of both the allopathic law of *contraria* and the homœopathic law of *similia*. Antiphanes, who lived about the same time, wrote a poem which contains the earliest known announcement of the homœopathic theory. Galen (born A. D. 130), the first great light in medical history after Hippocrates, first gave form and shape to that law of *contraria* which for many centuries ruled the medical world. Starting up, however, from time to time, during the centuries which intervened between Hippocrates and Hahnemann, were Paracelsus, Stahl, Haller, and others, who insisted upon the truth of the law *similia*, and pushed their investigations with more or less success in that direction; but it was not until it attracted the attention of Hahnemann that it created

much attention, or assumed the definite form of an important law in medical science. Hahnemann at the age of 35 occupied a prominent position as a scholar and chemist. While translating (1790) into German Cullen's "Materia Medica," the passage in which Cullen describes the action of cinchona bark excited his curiosity as to how this substance acted in curing ague. By way of experiment he took four drams of it in different doses, being at the time in perfect health. In a few days he experienced all the symptoms of ague. Was this ague, he inquired, the result of the action of the cinchona, or did it arise from the usual causes of the disease? There were two ways of testing this matter. One was to examine collections of reported cures, in order to ascertain whether among them any notice was to be found of instances in which the remedy employed was known to possess the property of exciting symptoms in the healthy similar to those which it cured in the sick. The other was to ascertain by experiment what was the effect of medicinal substances when taken by those in health, and then to administer them to those who were ill, and whose illness presented symptoms similar to those caused by these substances. The result of his historical researches is given in the "Introduction to the Organon of Medicine." He collected from an immense variety of sources testimony in regard to the twofold action of more than 30 medicinal substances; and one set of authorities proved the power of a certain drug to produce symptoms similar to those reported by other authors to have been cured by the very same means. Medical works in the present time are full of similar illustrations. For example, in the "Cyclopædia of Practical Medicine," edited by Forbes, Tweedy, and Connolly, we read, under the head of Fever: "Arsenical solution is the anti-periodic medicine on which, next to quinine, most reliance may be placed." One of the recognized authorities on the subject of ague is Dr. Boudin, who, after quoting a similar experience by M. Biot, says: "For my part, I saw an intermittent quotidian fever supervene, which I was obliged to combat with quinine, in a patient to whom I had given for ichthyosis about five grains of arsenic in twelve days." This occurred when there was no ague in the place. Thus, on the one hand, we have arsenic producing the disease, and on the other curing it. Dr. Copland, editor of the "Dictionary of Practical Medicine," says: "Ipecac is one of the best remedies that can be resorted to for asthma;" and Dr. Pereira, the author of the great work on materia medica, says: "In asthma benefit is obtained from ipecac in small and repeated doses." Sir John Forbes, one of the most distinguished physicians of his time, says: "Practitioners of experience, without subscribing to the doctrine of homœopathy, will certainly think more favorably of ipecac on account of its peculiar tendency

to induce fits of asthma in the predisposed." This direct antidote to asthma is known to cause asthmatic attacks in many persons. "How singular," says Dr. Marshall Hall, "that ipecac taken into the bronchia should excite asthma." "If I remain in a room," says Mr. Roberts of Dudley, "where the preparation of ipecac is going on, I am sure to have a regular attack of asthma." Sulphur cures peculiar forms of eruptive diseases; and all frequenters of the baths of sulphurous waters are acquainted with its effects in producing similar eruptions. Laennec, the discoverer of the stethoscope, says of tartar emetic: "From its use we sometimes find patients, doomed to almost certain death, out of all danger after the lapse of a few hours, without having experienced any evacuation or change but the rapid and progressive amelioration of the disease." Dr. Williams, a celebrated medical author, says: "Next to blood-letting tartar emetic is the most powerful remedy we can employ for the cure of acute pulmonary inflammation." Tartar emetic, according to these writers, and very general experience, cures pulmonary inflammation. The great French physiologist Magendie made this drug the subject of special experiment. After describing other changes it produced in animals which he poisoned with it, he says: "It acts specifically in inflaming the lungs." M. Pelletier, who has written the best monograph on this drug, says: "Its effect on the respiratory organs is to produce difficulty of breathing in dogs; the lungs were found hepatized. One would imagine that, admitting its action in man to be similar, far from being useful, its administration would be particularly pernicious in the treatment of pneumonia."—For several years Hahnemann seemed to be groping among specifics before he discovered the key to their successful administration. Medicines were given at first in massive doses, which, notwithstanding they generally cured the patient, sometimes produced fearful aggravations. At length, after a long course of experiment, the idea became firmly established in his mind that the organism through disease became exceedingly susceptible to the action of a drug given in accordance with the law of *similia*, and whose action was that of a direct specific on the diseased part. In 1799 an unusually fatal epidemic of scarlet fever prevailed at Königsbutter. Hahnemann, guided by the law of *similia*, selected belladonna as the appropriate remedy, administering it in minute doses; the curative effect was marked and decided. In 1801 his experiments with belladonna in scarlet fever were published at Gotha, and created much interest and no little opposition in Germany. In the same year he published a reply to the objections raised against his statements on the ground that so small a dose must be powerless, in which he says: "To the ordinary practitioner it is incredible that a person when sick is violently affected by a millionth part of

the same drug that he swallowed with impunity when he was well. Will physicians ever learn how infinitely small may be the dose that is sufficient for a cure, when the system of the patient is raised to a condition of intense and morbid sensitiveness? So powerfully do such small quantities act upon the over-sensitive frame, that the most serious disease is sometimes subdued in a few hours." Dr. Jörg, one of the most distinguished opponents of Hahnemann, says: "Medicines operate most powerfully on the sick when their symptoms correspond to the disease. Where there is inflammation of the intestines, a very minute dose of mercury will produce pain and other symptoms. It is in the very nature of things that a medicine must have a much greater effect when administered to a person already suffering under an affection similar to that which the medicine is capable of producing." Photography, according to homœopaths, presents a striking illustration of this idea. The healthy body, they say, may be compared to the plate before it has been washed, when it reflects the rays of the sun without its surface being at all affected by its influence; and the unhealthy body to the same plate washed by a chemical process, and thus rendered so sensitive to light that the faintest ray makes on it an indelible impression.—Thus far Hahnemann's knowledge of the specific action of medicine had been derived mostly from his collection made from medical history. But this, although sufficient to establish in his mind the truth of the law of *similia*, was not sufficiently accurate to serve as a foundation upon which to build the structure of a thoroughly scientific system of therapeutics. In 1805 he published a work on the positive effects of medicine and the effects produced by them on the healthy body, containing his observations upon 25 substances, most of them powerful vegetable medicines, in which their toxicological action, as shown by actual experiment on the healthy living body, is minutely described. In conducting his experiments, the substance to be tested was distributed among his assistants, who each took a succession of doses and carefully recorded the symptoms. These were compared with his own; and several years after, when the same drugs were re-proved by a society at Vienna, every one of the observations of Hahnemann was confirmed. In 1831 the cholera first invaded Europe. In Hungary 8,000 died out of 10,000 who were seized. Medicine seemed powerless, and the consternation was universal. Hahnemann, guided by his law of *similia*, selected camphor as the appropriate remedy to be given at the first onset of the disease; and experience has since justified the wisdom of his selection. Other remedies were pointed out in the different stages of cholera, but the usefulness of camphor, given according to Hahnemann's directions, is now generally admitted.—To be guided intelligently by the law of *similia*, the

keynote of their system, homœopaths believe we must have an accurate picture of the pathological changes resulting from the drug as indicated by the appearance of tissues after death, and its action as shown upon the living structure in vivisection. For this the most careful observation is required—not only the selection of cases of accidental poisoning, and others from historical records and daily practice, but the actual placing of the system under the direct action of the drug, and the careful noting of each individual symptom. Hence has arisen the plan of "proving" medicines, as inaugurated by Hahnemann, and which they claim as the only correct basis of a true scientific *materia medica*. Their *materia medica* is made up of drugs so tested by several observers, and the symptoms corresponding noted as the characteristic ones of the drug. Growing out of this law, as a natural sequence, and forming the second grand division of the system, is that of the dynamization of medicines. The system having become sensitively acute to the action of a drug, this, when given homœopathically, or in accordance with the law of *similia*, should be given in a dose so minute as only to act on the part morbidly susceptible. If given in too large doses, so as to produce its primary or drug action, no relief would be obtained, but harm might ensue; while if given in too small doses, no action whatever would result. Hence the importance not only of the homœopathic selection of the remedy, but its administration in doses of only sufficient strength to produce its tonic or curative action. The homœopath insists upon the positive purity of his drugs, and in those of a vegetable character usually prefers the expressed juice, discarding the inert material. By the process of dynamization, in which the particles are more completely broken and subdivided, it is believed the latent power or life of the drug is often set at liberty, and materials which in their crude state are almost inert are found to possess a strong influence as remedial agents. Thus mercury or quicksilver in its crude state has no medicinal action; but when its particles are subdivided by trituration with a non-medicinal substance, the conserve of rose, we get blue mass, or blue pill, whose power is well known. So, in the preparation of homœopathic attenuations, the crude drug, carefully divested of impurities, is triturated thoroughly with a non-medicinal substance, sugar of milk, or dissolved in alcohol or distilled water. One grain of the crude drug triturated with nine of sugar of milk, or dissolved in nine drops of alcohol, forms the first decimal attenuation; and one part of the drug combined with 99 of the sugar of milk or alcohol forms the first centesimal attenuation. To get the second decimal or centesimal, one part of the first is combined with 9 or 99 parts of the non-medicinal substance; and so on through the successive steps of the process. The first step is to select the drug homœopathic

to the disease, and give it either in its crude form or in its attenuation, as best seems to meet the exigencies of the case.—What homœopaths claim as cardinal principles are: 1. The law of *similia*, or the treatment of disease by medicines whose effects, tested on the living, healthy organism, are similar to the symptoms present in disease. They do not claim this principle as universal or exclusive, since medicines are often required for their mechanical, nutritive, and chemical effect; but they assert that it is of great value, and, when carefully considered and correctly applied, gives when indicated the most satisfactory results. 2. They assert that the law of *similia* demands an intimate knowledge of the effect of the drug upon the healthy organism. The question of dose is left to the individual judgment of the practitioner; but when given in accordance with the law of *similia* it is found that a greatly reduced dose gives the most satisfactory results. The homœopathic doctrine, as above stated, admits of a wide diversity on minor points. Some in this school confine themselves to the high potencies; but the majority range in their prescriptions from the crude drug up through what are called the lower potencies; all however admitting, as the key-stone of the system, the law of *similia*.—In 1825 homœopathy was introduced in the United States by Hans B. Gram, a native of Boston, but educated in Copenhagen. His success attracted the attention of several physicians, among whom were Gray, Channing, Willson, Hall, and Hering. A careful study of the principles of the new theory secured their adherence; and its success, not only in ordinary diseases, but in usually fatal epidemics, soon won for the system a large support. In the United States the school now (1874) numbers about 6,000 physicians. There are nine homœopathic colleges, which at the session of 1872-'3 graduated 204 students. Every college has a dispensary connected with it for clinical teaching, and five have flourishing hospitals; and there are 32 dispensaries not connected with any college. There are 31 hospitals and asylums under the charge of this school.—The school, for its age, is rich in practical literature. Among the important works are: Hahnemann's *Organon*, *Materia Medica Pura*, and "Chronic Diseases;" Hartmann's "Acute and Chronic Diseases;" Jahr's *Symptomen-Codez* or "Manual of Materia Medica;" Bönninghausen's "Therapeutics;" Baehr's "Theory and Practice;" Grauvogel's "Practice;" E. Guernsey's "Practice;" H. H. Guernsey's "Obstetrics;" Dudgeon's "Lectures;" Hempel's "Materia Medica;" Helmuth's "Surgery;" and Franklin's "Surgery." There are also published in the United States 13 periodicals devoted to homœopathy.

HOMOOUSIANS (Gr. *ὁμός*, the same, and *οὐσία*, being, essence), in ecclesiastical history, a term which was originated in the 4th century to distinguish the Athanasian or orthodox party from

the Arians, who were called, among other names, Heterousiasts (*ἕτερος*, different, and *οὐσία*), and the Semi-Arians, who were termed Homoiousians (Gr. *ὁμοιος*, similar, and *οὐσία*). The Homoousians maintained that the Son was of the same essence as the Father; the strict Arians, that he was of different essence; and the Semi-Arians, that he was similar to the Father in essence, but not identical with him. (See **ARIANISM**.)

HOMOPTERA. See **HEMIPTERA**.

HOMPESCH, Ferdinand von, the last grand master of the order of St. John, born in Düsseldorf, Germany, Nov. 9, 1744, died in Montpellier, France, in 1803. He was of a noble Prussian family, and at the age of 12 went to Malta, where he became a page of the grand master Rohan, and gradually rose to the rank of grand cross, through the influence of Austria, of which he was for 25 years the representative at Malta. In 1797 he became grand master, succeeding Rohan. In June, 1798, Bonaparte, on his way to Egypt, touched at Malta and took possession of the island, seizing 1,200 guns and a large amount of treasure. Hompesch received 100,000 crowns as the value of his plate, and was offered an annuity of the same amount, which he refused to accept. He was sent to Trieste, and upon his arrival there protested against the seizure of Malta, and made over his grand mastership to Paul I., czar of Russia, who granted him a pension. This ceasing on the death of the czar, Hompesch fell into want, and went to France to urge the French government to pay him the annuity which he had previously declined. He received a grant of 5,000 francs in 1803.

HOMS, **Hums**, or **Hems** (anc. *Emesa* or *Emissa*), a fortified city of Syria, 90 m. N. by E. of Damascus, about 1 m. from the river Aasy or Orontes; pop. about 30,000, including 7,000 Greek Christians. It is a prosperous town, having considerable trade, and manufactories of woollen, cotton, and silk fabrics, and of gold and silver thread. The houses are built of black basalt, and many of the streets are paved with the same material. In pagan times Emesa was celebrated for its magnificent temple of the sun, one of whose priests, Elagabalus, was made emperor of Rome in A. D. 218 by the legions of Syria. Odenathus, husband of Zenobia, the renowned queen of Palmyra, was murdered in this city in 266, and Zenobia herself was vanquished in its vicinity, in 273, by the emperor Aurelian. Lying in the direct route which an army must traverse in passing between Egypt and the Euphrates, the ancient Emesa was occupied in turn by invaders from either direction. In 636 it was captured by the Saracens, and it passed under the control of the successive Moslem dynasties. In 1099 it was taken by the crusaders, and in 1175 by Saladin. After many vicissitudes it was in 1517 added to the Ottoman empire. In July, 1832, Ibrahim Pasha of Egypt here gained a decisive victory over the pasha of Aleppo. In 1840 it was with the

rest of Syria restored to Turkey by the intervention of the European powers.

HONDURAS, a republic of Central America, lying between lat. $13^{\circ} 10'$ and $16^{\circ} 5' N.$, and lon. $83^{\circ} 12'$ and $89^{\circ} 47' W.$, and bounded N. and E. by the Caribbean sea, S. by Nicaragua (from which it is separated for about half its length by the river Segovia), the Pacific, and San Salvador, and W. and N. W. by Guatemala; length from E. to W., 440 m.; greatest breadth N. to S., 200 m.; area, about 50,000 sq. m. The coast line on the Atlantic is much more extensive than that on the Pacific, its length being about 400 m.; it is comparatively even, low and marshy E. of lon. 85° , and often high and rocky W. of that point. The Pacific coast line is but 60 m. in length, very irregular and

low, and subject to inundation by spring tides. Both coasts are unhealthy, but the miasmatic influence does not extend far inland. Off the Atlantic coast are Ruatan, Guanaja or Bonaca, Utila, Helena, Barbaretta, Morat, and other smaller islands dependent upon the first, the whole group being known as the Bay islands, and under the jurisdiction of Jamaica. They are chiefly inhabited by British subjects, an occupation in violation of the express terms of a treaty made with the United States in 1850. Guanaja is celebrated as having been the point from which Columbus in 1502 descried for the first time the Central American mainland. The principal ports of Honduras, which are among the most commodious in Central America, are Omoa, Trujillo, Puerto Cortés (formerly called



Puerto Caballos), and Amapala; the first three are on the Caribbean sea, and the last on Fonseca bay in the Pacific. That of Omoa, formed by a small bay opening to the N. W., and offering safe anchorage to vessels of the deepest draft, is the exporting and importing centre for the departments of Yoro, Olanchito, and part of Tegucigalpa; the town, situated $\frac{1}{2}$ m. from the harbor in a marshy region, is very unhealthy. Trujillo, on a delightful bay of the same name, was an important shipping town in colonial times; but being situated so far from the populous parts of the country and the more frequented paths (there being no roads), it has gradually lost its prestige. Puerto Cortés was for more than two centuries the principal entrepot on the coast; it stands on a bay 9 m. in circumference, at a short dis-

tance from Omoa, and may be entered by the largest ocean steamers, which there find secure mooring ground and convenient docks. Amapala, on the N. E. shore of the island of Tigre, facing the island of Sacate Grande, the only port of Honduras on the Pacific, has excellent anchorage, thorough shelter, and good facilities for repairing ships. All the ports in the republic are now free; that of Amapala was declared so in 1857, the inhabitants being exempt from military service and all imposts, save in time of war, and from tithes and excise. The bay of Fonseca, washing the shores of San Salvador, Honduras, and Nicaragua, is about 35 m. long and 45 m. wide, and contains the finest "constellation of ports" on the W. coast of America. Among its numerous islands are Sacate, the largest, and Tigre, rising like a

huge cone to an altitude of 1,950 ft. Tigre is 20 m. in circumference, and is mainly covered with valuable timber.—Taken as a whole, the face of the country is essentially mountainous, and though nowhere attaining an elevation equal to the greatest in Guatemala, the surface is more diversified than in that state. The only consecutive chain of mountains is the Sierra Madre, which enters the republic at the west from Guatemala, and separates in the knot of Merendon into two great branches, N. E. and S. E. The former reaches to the bay of Honduras, terminating in the mountains of Omoa, the mean altitude there being 8,000 ft., and the maximum 9,000 ft.; it takes in its course thither the names of Sierra del Espiritu Santo and Grita. The latter, trending first S. E., then E., under the name of Pacaya mountains, deflects to the N. W., and forms the great knot designated as the Selaque mountains, whose highest peak, 10,000 ft., may be regarded as the culminating point of Honduras. N. E. of the Selaque group are the Puca mountains, presenting also a lofty peak, and connected by a S. E. range of comparatively low hills with the Opalaca chain, which is in turn linked by another series of hills curving S. and W. to the mountains of San Juan, and these again to the Montecillos chain, N. of which are two parallel chains, Santa Barbara to the west and Canchia to the east, separated by the broad valley of Lake Yojoa. The republic is here bisected by the valleys of the Humuya-Ulua system and the Goascoran, which rivers, rising in the same ridge S. E. of the Montecillos, flow N. and S. respectively, the Ulua to the bay of Honduras, and the Goascoran to Fonseca bay. East of this bisecting line are the Comayagua mountains, with a few lofty summits; the Lepate-rique chain lies S. of these, and the remarkable Sulaco group N. E., sending down from their elevated crests waters to either ocean. Due S. of the Sulaco knot are the Chili mountains, forming part of the southern boundary with Nicaragua; and due N. of it, near the Atlantic coast, rise the Congrehoy peaks, ranging in height from 5,500 to 8,000 ft. Of the orography of the country stretching E. of lon. $86^{\circ} 30'$ nothing definite is known. The N. E. portion has successive mountain ranges, some of which descend to the very coast, while others dwindle at a considerable distance inland; and all are separated by vast terraced plains, such as those of Yoro and Olanchito, celebrated for the number and excellence of their cattle, but inhabited only by tribes of savage Indians. A feature worthy of remark in the mountain system of Honduras is the absence of the volcanic coast range on the Pacific, which is so extensively developed in the other Central American states, especially in Guatemala and San Salvador, but which is here represented by the numerous volcanic islands dotting the bay of Fonseca, supposed to have been itself formed by volcanic agency. The plain of Comayagua is

of extraordinary beauty; it is about 40 m. long from N. to S., with a mean breadth of perhaps 10 m.; and with it may be enumerated the plain of Espino immediately N. and almost contiguous to it; that of Sensenti, walled round by the Merendon, Pacaya, and Selaque mountains; and still others, all extremely picturesque and fertile.—In Honduras, as elsewhere in America, the principal rivers flow to the Atlantic. The Segovia, called also Coco, Oro, and Wanks, already mentioned as forming a portion of the southern boundary, receives its principal waters from Honduras, and hence should be regarded as forming a part of its river system; its course, about 350 m., through an unbroken wilderness, is over a rocky bed, which, together with a succession of rapids, renders the river unnavigable except by canoes. The largest river entirely within the territory is the Ulua, formed by the united waters of the Santiago and Humuya, with their respective tributaries the Santa Barbara and Sulaco, and holding a course N. by E. to the Atlantic, into which it falls about lon. $87^{\circ} 49'$; the Humuya is the main branch, rising in the mountains on the southern border of the plain of Comayagua. There is but 9 ft. of water on the bar traversing the mouth of the Ulua, but steamers of small draft can ascend as far as the junction of the Santiago, a distance of about 70 m. by the course of the stream. The aggregate waters of the Santiago-Humuya system are computed to drain nearly one third of the territory of the republic. Next in order is the Rio Tinto, rising in the mountains bordering the valley of Olanchito, in the N. E. portion of the country, and with a course of perhaps 150 m.; but its shallowness, and a bar with but 7 ft. of water at the entrance, impede its navigation except by small craft, which go up about 60 m. The Patuca, still further E., is a powerful stream, receiving tributaries of considerable magnitude from most of the mountains in the vast department of Olanchito; one of these tributaries, the Guayape, is about 250 m. long, and remarkable for its extensive gold washings; the whole course of the Patuca proper is probably not less than 200 m. Its bed presents similar obstructions to those of the other rivers named, but in spite of this the Patuca is said to be navigable for small steamers as far as the Portal del Infierno, and to be for commercial intercourse with the interior the best river on the E. coast of Central America. The Chamelican rises in the Merendon mountains, and after a serpentine course, generally N. E., discharges into the Caribbean sea a short distance W. of the Ulua; its valley abounds in valuable products, but it has little capacity for navigation. The other streams, mostly descending from the Sulaco mountains, and the largest of which are the Lean and the Aguan, are relatively unimportant. Two fine rivers flow southward to Fonseca bay: the Goascoran, which rises but a few miles S. of the head waters of the Humuya, and is about 80

m. long, and easily fordable in the dry season; and the Choluteca, which rises on the northern slope of the Lepaterique mountains, around the N. E. extremity of which it sweeps, and then runs S. W., having a total length of more than 150 m., and passing the cities of Tegucigalpa and Choluteca. Large canoes (*bongos*) and other light craft navigate the latter to a considerable distance from the sea. The only lake of note is that of Yojoa, in the bottom of the valley between the mountains of Santa Barbara and Cancchia, at an elevation of 2,050 ft.; it is 25 m. long by about 7 wide, with an average depth of 4 fathoms; it sends to the Humuya two tributaries, the Santa Barbara from its southern extremity, and the Blanco from its northern, which join the Humuya within two or three miles of each other. Near the E. shore of Yojoa an immense spring of crystalline bluish water, 75 ft. in diameter, gushes from the earth, and flows into the lake in a volume equal to that of any of the outlets of the latter. The eastern portion of the Caribbean coast is lined with salt-water lagoons and marshes, some of the former being of considerable extent, such as the Laguna de Cartago, 40 m. long, and the Laguna de Cartine, 50 m. long.—Mining, in early times the absorbing industry of the country, has dwindled almost to insignificance for lack of capital and enterprise, and of suitable roads for the transport of adequate machinery to the mining districts. Civil strife has also contributed to restrict operations, and hundreds of mines susceptible of being profitably worked are abandoned in every part of the country. Silver and gold are the most abundant metals; the silver mines lie mostly in the S. W. ranges of mountains, while gold is more plentiful toward the Atlantic. The chief silver mines are those of Tegucigalpa and Gracias; the mineral is there found in various combinations with iron, lead, copper, and sometimes antimony, while chlorides are among the richest of all the ores. Few gold mines are now worked, those of San Andrés in the department of Gracias, and others near San Juan Cantaranas in Tegucigalpa, forming almost the only exceptions. The rivers Guayape and Jala, as also the Guayambre, in the department of Olancha, abound in auriferous sands, the washing of which is still extensively carried on, and yields handsomely. Copper mines are numerous and of great value; but most of them have been abandoned, or rather were never worked except in the search for silver. Coal exists in several localities, and there is an abundance of limestone, veined, white, and blue, in every part of the republic, and especially in the transverse valley extending from Fonseca bay to the bay of Honduras; and there are quarries of beautiful marble suited for statuary in the Omoa mountains. Ancient monuments in the vicinity of Copan, near the Guatemala frontier, and of the same or a kindred type with those of Palenque, would seem to point to the early

occupation of that region by a civilized people. (See COPAN.)—The climate is hot on the Caribbean coast, but remarkably mild and equable in the highlands, the temperature varying for the whole year from 62° to 86° F., according to elevation. In the interior the months of April, May, and June are the hottest, while in November, December, and January the atmosphere is sufficiently cool to admit of fire. Elsewhere than on the Caribbean coast the dry season lasts from November to June, little rain falling during that period. The rainy season is usually ushered in by violent thunderstorms, which rarely occur in the forenoon; while thunder, accompanied by northerly, is frequent at the end of that season. Squier says that "there can be no generalization on the subject of the climate of Honduras, except so far as to say that it has a variety adapted to every caprice, and a temperature suitable for the cultivation of the products of every zone." Miasmatic and intermittent fevers are only known on the coast; goitre is prevalent in the highlands.—The soil of Honduras is extremely fertile; in the coast regions the various species of tropical vegetation are luxuriant; and on the elevated table lands of the interior maize and the several European grains yield ample harvests with the rudest cultivation. The sugar cane is indigenous in Honduras as in the other Central American states, and of a distinct species from that cultivated in the Antilles; it thrives well in all parts of the country, even at elevations of 4,000 ft. Coffee likewise flourishes, but its culture is greatly neglected; indigo and other dyes are produced in limited quantities; but cochineal is no longer an object of care, although the nopal abounds in the plain of Comayagua, and its leaves are covered with the webs of the *cochinilla silvestre* or wild cochineal. Tobacco of excellent quality is raised, and even exported at times to Cuba, where it is prepared and sold as of native production. Pimento, capsicum, and many other spices are plentiful. The various fruits and vegetables of the temperate zone abound in the interior and require but little care; manioc is everywhere produced; and the yams of Omoa are celebrated alike for their prodigious size and exquisite flavor. The arboreal vegetation of Honduras is unsurpassed by that of any other region N. of the Orinoco; the mahogany, rosewood, and other precious cabinet woods, together with the vast forests of timber for constructions of all kinds, may be classed among the chief sources of the national wealth. Fustic, Brazil wood, annatto, and other dyewoods, and also gum and medicinal trees and plants, as copaiba, copal, liquidamber, and India-rubber trees, ipecacuanha, the palma Christi (yielding castor oil), and many others, are very abundant.—The indigenous fauna includes animals both of more northerly and of the equatorial regions. The felidæ comprise the jaguar, puma, black tiger (*felis discolor*), and ocelot; the coyote or Mex-

ican wolf is common; there are several varieties of armadillos and ant-eaters; pacas are numerous, and their flesh is by some accounted a delicacy; and to these may be added two species of deer, red and brown, peccaries, wareses (wild hogs), tapirs, raccoons, opossums, squirrels, and hosts of monkeys of different varieties. Alligators abound in every river and lake, and sharks along both coasts. Lizards of various kinds are extremely numerous, among them being the iguana, often 4 ft. in length, the flesh of which is commonly eaten. The rattlesnake and coral are the only venomous serpents, but many harmless species exist. The green and hawksbill turtles, the latter furnishing the tortoise shell of commerce, and many kinds of land turtles, are found. Endless varieties of edible and other fish inhabit the rivers and lakes, and abound on the coasts; and there are several species of edible mollusks, and crustaceans, such as oysters, lobsters, crabs, &c. Bees are plentiful and yield large quantities of honey. Mosquitoes are unknown, save in the marshy regions of the Caribbean coast, where the *nigua*, a small insect which burrows under the skin of the feet producing sluggish sores, is also found in considerable numbers. Tarantulas, scorpions, and enormous scolopendræ infest all regions; and myriads of locusts sometimes visit the country, darkening the air as their column passes, and utterly destroying every green thing where they alight. Hawks, vultures, and zopilotes or turkey buzzards are the only predatory birds; pelicans and many other aquatic birds abound; partridge, quail, snipe, pigeons, wild turkeys, plovers, and similar birds are numerous in the interior; humming birds of many varieties are found, as are also numerous species of warblers.—Agriculture is extremely backward; laborers are scarce, and the natives are strongly opposed to continuous exertion, especially in the open air; so that even the comparatively small portion of the country under cultivation is very imperfectly tilled. In the plains of the interior large numbers of cattle, horses, asses, and mules find rich and abundant pasture; yet little care is taken of these animals, except the mules, by which almost all the carrying trade is performed; and the quantities of hides and other animal products exported are comparatively insignificant.—The manufactures consist exclusively of coarse woollen stuffs and rude utensils for domestic and field uses, and are analogous to those of Guatemala and Mexico. Mahogany cutting is an important occupation during the months of August, September, and October. Of the commerce of the republic it is difficult to give accurate statements, there being no official returns published. The chief staples of export are mahogany, tobacco, cattle, hides, sarsaparilla, indigo, and other dyestuffs. According to a communication of President Medina in 1872, the value of the exports may be estimated at \$1,230,000, dis-

tributed as follows: bullion, \$600,000; indigo, \$200,000; cattle, \$150,000; timber (mahogany, &c.), \$180,000; hides, &c., \$100,000. The imports comprise cotton and silk fabrics, hardware, and machinery, the first two mainly from Great Britain, and much of the others from the United States. The internal communication is chiefly effected, as already observed, by mules; on some of the rivers, however, the transportation is carried on in bongos or large canoes. There is an interoceanic railway in process of construction from Amapala to Puerto Cortés, through the transverse valley of the Goasoran and Humuya rivers; the total length is to be 232 m.; the first section, extending from Puerto Cortés southward 56 m., is built, and it was reported in 1873 that the traffic was already sufficient to almost meet the running expenses. The line, according to the terms of the contract, was to have been completed in 1872; but it has been retarded by civil wars and the lack of adequate capital. A material drawback to the public welfare is the want of suitable roads, very few worthy of the name as yet existing. In 1873 some measures were taken by the government for repairing a road leading from the capital to Potrerillos, and otherwise facilitating the transportation of merchandise.—Honduras is divided into the seven departments of Choluteca, Comayagua, Gracias, Olancha, Santa Barbara, Tegucigalpa, and Yoro, each of which is subdivided into districts. The same uncertainty attends the statistics of population as those of commerce; no official census has ever been taken, nor has the government published any data on the subject. It may fairly be presumed, however, that Honduras has 400,000 inhabitants, of whom some 184,000 are Indians, 205,000 mestizos, 5,750 whites, and 5,250 negroes. The whole country E. from the longitude of the river Aguan is almost exclusively occupied by independent aboriginal tribes, the two best known of which are the Jicaques and the Poyas, both probably being branches of the Carib stock. Numbers of them have embraced the Catholic faith, and are fairly entered upon the career of civilization; their chief occupation is husbandry. There is in the region adjacent to the Laguna de Cartago a people called black Caribs, who have evidently a large admixture of African blood. The whites are mostly descended from the early Spanish settlers; they inhabit the larger towns, especially the seaports, and the extensive haciendas scattered through the interior in the western portion of the country.—The government is based upon a charter promulgated in November, 1865. The executive power is vested in a president elected for a term of four years, and aided in the administration by a council of state composed of two ministers appointed by himself, a senator elected by both houses of congress, and the judge of the supreme court. The legislative power rests in a congress consisting of a senate and a chamber

of deputies. The finances of the republic are in great disorder, nor can any definite statements thereof be obtained, inasmuch as the receipts of the custom house are usually farmed out to merchants and other capitalists, whose interest it is not to make regular returns. The revenue, one third of which is derived from imports, is estimated at \$400,000 annually. Nothing is known of the home debt; the foreign debt amounted at the end of 1872 to \$29,950,540, made up of three loans: the first contracted at the London stock exchange in 1867, for the nominal amount of £1,000,000; the second issued at the Paris bourse in 1868, for the nominal amount of 62,252,700 francs; and the third negotiated at the London stock exchange in 1870, for the nominal amount of £2,500,000. The English loans were at 10 per cent. interest, and issued at the price of 80; and the French loan at 6 per cent., issued at the price of 75; and all were raised for the purpose of constructing the interoceanic railway. In May, 1872, the Honduras government issued in London the prospectus of a "10 per cent. ship railway loan" of £15,000,000, "for the purpose of adapting the railway now in course of construction to a ship railway across the republic of Honduras," that is, "a railway capable of conveying ships of heavy tonnage, without disturbing the cargo, between the Atlantic and Pacific oceans, to and from Puerto Cortés and Fonseca bay." This loan, which was to be in 150,000 bonds of £100 each, at the price of 80, and to be repaid in 15 years, met with no subscribers in England.—Education is at a low ebb, there being, besides the so-called universities of Comayagua and Tegucigalpa, very few schools, and those existing devoted only to the primary branches. Indeed, the children of such as can afford the expense are sent either to Guatemala or to Europe for their education. President Arias, shortly after his accession in 1872, signified a desire that an adequate number of public schools should be established throughout the country. The religion of the people is the Roman Catholic, under the jurisdiction of the bishop of Comayagua.—The coast of Honduras was discovered by Columbus in 1502; and in 1526 Cortes, at the head of an army which he brought from Mexico, composed of Europeans and Indians, took possession of the country, and founded the towns of Trujillo and Puerto Caballos (now Puerto Cortés). The whole known portion of Central America was shortly afterward proclaimed to belong to Spain, and placed under the government of the *audiencia de los confines*, the seat of which was fixed at the present town of Gracias, which from that circumstance rose rapidly in importance. In 1823 Honduras entered into the Central American confederation; but it became an independent republic in 1839, and took part in the wars and intrigues which followed each other in rapid succession till 1862. Civil strife also contributed to retard the material progress of

the country. In 1861, for instance, many attempts were made at insurrection, the principal instigators being the clergy, who preached dissension from the pulpit. Guardiola, who was at that time president of the republic, thwarted all their designs, but granted a universal amnesty, not excluding even the vicar, who was the chief promoter of the discontent. Guardiola was shortly after assassinated, and Montes succeeded him. One of his first acts was to make a treaty of alliance with San Salvador against Guatemala and Nicaragua. His army was defeated at Santa Rosa in Guatemala, and one of his generals, Medina, joined the victorious army of the enemy, overthrew Montes, and caused himself to be proclaimed president (July, 1863). Medina resigned the government in 1864, but was immediately re-elected; and he continued in the presidency until his deposition in 1872 by Don Celeo Arias, now (1874) provisional president of the republic. A treaty of peace and amity with Spain was signed March 15, 1866.

HONDURAS, Bay of, a large triangular body of water, an arm of the Caribbean sea, lying between the republic of Honduras and the peninsula of Yucatan. It is remarkable for its great depth of water, which some writers suppose to have originated the name Honduras (Sp. *hondura*, depth), subsequently applied to a portion of the mainland. The S. W. portion of the bay, penetrating into the continent, between Guatemala and Honduras, is known as the bay of Amatique. Along the coast of the peninsula of Yucatan the bay is studded with coral keys or cays, which form an almost continuous line, at a distance of 10 to 25 m. from the shore, and act as a kind of natural break-water to the continent. It was in the smooth water behind these keys that the buccaneers, well acquainted with the intricate channels between them, found refuge against the attacks of the Spanish fleets. Approach to the peninsula is at all times difficult and sometimes dangerous, and many vessels are annually lost in endeavoring to reach the coast of British Honduras. The most dangerous reefs or banks are those of Chinchorro, or the Northern Triangles. On the side of Honduras the bay is open, the water deep, and navigation only impeded by the group of islands known as the Bay islands, which however are high, and easily avoided by mariners. The waters of the bay are generally tranquil, and storms occur only during the prevalence of the northers in the gulf of Mexico, which sometimes sweep over it, but with diminished force. Few of the cyclones of the Antilles reach the bay of Honduras.

HONDURAS, British, or Balize, a British colony occupying the extreme N. E. corner of Central America, and lying between lat. 15° 54' and 18° 30' N., and lon. 88° and 90° 30' W. It is bounded N. W. and N. by Yucatan, E. by the bay of Honduras, and S. and S. W. by Guatemala; area, about 13,500 sq. m.; pop. in 1871,

24,710. The people are mainly negroes, the descendants of slaves, with some Caribs springing from refugees from San Vicente, who first established themselves on the northern coast of Honduras, and after the independence of that republic settled in Balize. There are some other Indians in the colony, originally from Yucatan; but of the aboriginal tribes, traces of whose handiwork still exist in the tumuli called by the mahogany cutters "Indian hills," none are now to be found anywhere E. of the Chama range of mountains. Balize, the capital and the only town of importance, has a population of about 6,000, which at Christmas time, however, owing to the mahogany trade, increases to about 15,000. The surface of the country is very irregular, though none of the mountains attain a greater elevation than 4,000 ft. The coast is generally low and swampy, and the shore is studded with islets or keys, clothed with a dense arboreal vegetation. These keys, while they serve as a natural breakwater and so afford secure refuge for ships save when northers prevail, render the approach difficult. The country on receding from the coast completely changes its aspect, rising into low hills separated by delightful valleys; and in the south are several parallel ridges, the highest of which are the Cockscomb mountains. The rocks are principally primary and calcareous. Gold has been discovered in the streams; valuable specimens of crystals have been found; and strata of fine marble and alabaster formations are known to exist.—Of the rivers, the Hondo, forming the northern boundary with Yucatan, is the longest; it rises in or near Lake Gumustan in Vera Paz, and has a generally N. E. course of perhaps 250 m. to its mouth on the Caribbean shore. The Balize rises in the same region, holds a N. E. by E. course of about 200 m., and discharges into the Caribbean sea by one mouth at the town of the same name, which it divides into two portions, and by another $3\frac{1}{2}$ m. N. Laboring creek, a branch of this river, about 100 m. inland, is remarkable for the petrifying properties of its waters, which have a cathartic effect upon strangers, and a healing property when applied to ulcers. New river, between and parallel to the two first mentioned, is also a fine stream, issuing from an extensive lagoon. About 35 m. S. of Balize is the river Manatee, which one mile from its mouth spreads into a magnificent sheet of water, several leagues in extent; the picturesque of the scenery surrounding this lagoon is greatly enhanced by the mountains of the same name, rising on its southern margin to a height of 1,000 ft. The Sibun, a short distance N. of the Manatee, is like that remarkable for rapids of considerable acclivity, as also for a series of singular and beautiful caves excavated by the waters. Still further S. a half dozen other streams of minor proportions hurry by short courses to the sea. The climate, though generally mild, is said to

be unfavorable to Europeans; the heat rarely exceeds 83° F., and the annual mean is considerably less than this at Balize and along the whole coast, where tempering eastern breezes prevail nine months in the year. During the wet season from June to October heavy rains are frequent, and the malaria arising from the decomposition of organic matter in the lowlands renders this period unhealthy. The soil in most parts is very fertile. In this respect the country is distinguished into two divisions, the pine and the Cahoum ridges. The subsoil in the first is composed of a loose reddish sand, peculiarly genial to the pine from which it takes its name, and similar productions; and extensive prairies also cover this soil. In the Cahoum ridge the soil consists of a rich deep loam, suitable for every species of European and many species of tropical food plants; brushwood grows thickly here, and the wild cotton and other large trees abound. Rice and arrowroot are cultivated to a limited extent, maize thrives well, yams and manioc are largely produced, and there is a great variety of spontaneous tropical fruits. Sugar, coffee, cotton, and indigo are comparatively neglected, in spite of the suitability of the soil for their culture. Tobacco culture has proved remunerative, and the quality of the plant is little inferior to that of the finest Cuban. The want of adequate capital and labor prevents the extension of agricultural industry. A company was formed about 1865, with a considerable capital, for the production of sugar; but their efforts have not been very successful. The great staple of export is mahogany, the felling of which constitutes the main industry of the inhabitants, who float the logs down the rivers, and bring them for sale to Balize at Christmas time. As many as 10,000,000 ft. of the wood have been exported in a single year. Logwood, next in importance after mahogany, is found in immense quantities; and the cahoum palm, from the nut of which is extracted an excellent oil for exportation, likewise abounds, especially in the Cahoum ridge. The *pinus occidentalis*, growing to a height of 60 ft., is valuable for its tar and turpentine. The fauna of this territory is exactly similar to that of Honduras.—The articles exported are mainly mahogany, logwood, and other dyestuffs, sugar unrefined, coffee, raw cotton, and India rubber. The value of exports to Great Britain for five years was: 1868, \$703,600; 1869, \$946,050; 1870, \$480,110; 1871, \$780,185; 1872, \$879,090. The imports from the same country in the same period were as follows: 1868, \$668,775; 1869, \$634,130; 1870, \$801,280; 1871, \$829,385; 1872, \$737,960. A curious article of export is the queen conch shell, abundant on the coral reefs which fringe the coast; 12,000 of these were sent in one year to Paris, to be worked into cameo brooches, shirt studs, &c. The total value of the exports and imports in 1871 was \$1,856,845. Internal communication is here hindered by the same diffi-

culties as in the neighboring states. The revenue in 1872 amounted to \$193,595; and the public debt in the same year was reduced to \$112,650. The colony contributes about \$25,000 toward defraying an expense of \$66,820 incurred annually by the mother country for maintaining a military station here. Education is little attended to, and the few schools have but a small attendance. The government of British Honduras has been administered by a lieutenant governor since May, 1862, when the settlement was raised to the rank of a colony. The governor is appointed by the crown. The legislative power is vested in a council composed of seven magistrates elected annually by the people.—Little is known of the early settlement of this coast. It seems to have been resorted to occasionally by wood cutters in the 16th century. Some British subjects, attracted by the abundance and excellence of the mahogany and logwood, came from Jamaica and made the first permanent settlement; and this thrrove so rapidly that the immigrants were soon followed by a large number of others, who extended their explorations as far W. as Campeachy, in the vicinity of which town they established some colonies. After many unsuccessful efforts by the Spaniards to drive out the intruders, these were at last compelled to retreat within the present limits of the territory. In 1754 an invading expedition of 1,500 Spaniards was defeated by a small body of English settlers; another attack was made in 1779, and the inhabitants were obliged to flee to Mérida and Havana, where many of them died in captivity. By 1783 the settlement was again prospering, and the people, after repeated altercations with their Spanish neighbors, on July 10, 1798, repulsed a formidable attack made by a fleet of vessels and a land force of 2,000 men. Since that time the country has remained in tranquillity as a British possession, having been specially excepted from the treaty between England and the United States, June 29, 1850, by which the two powers mutually agreed "not to occupy, fortify, or colonize any part of Central America."

HONE, William, an English author, born in Bath in 1779, died in Tottenham, Nov. 6, 1842. At the age of 10 he was placed with an attorney in London, but after the expiration of his apprenticeship he abandoned the law, and in 1800 set up as a bookseller, with a circulating library, in Lambeth Walk. During the next 16 or 17 years he experienced a succession of vicissitudes. Having no talent for business, he failed in almost every enterprise he undertook, and repeatedly became bankrupt. In 1817 he brought himself into great notoriety by the series of political satires entitled "The Political House that Jack built," "The Man in the Moon," "The Queen's Matrimonial Ladder," "A Slap at Slop," "The Political Showman," "Non Mi Ricordo," &c. Among these were several in the nature of parodies on various parts of the "Book of Common Prayer,"

for the printing and publishing of which Hone was tried on three separate indictments in December, 1817, but was acquitted in each instance. His "Three Trials," describing the proceedings on this occasion, went through 19 editions before the close of 1818. His friends attempted to set him up in business as a book auctioneer, but in a few years he found himself the inmate of the King's Bench prison, where during a confinement of about three years he edited and published his "Every-Day Book" (2 vols. 8vo, 1826-'7), "Table Book" (8vo, 1827-'8), and "Year Book" (8vo, 1829), his most useful works. Upon his release from prison he attempted to establish himself as landlord of the Grasshopper coffee house, but failed. Finally he joined an Independent church, became a preacher, and officiated until disabled by paralysis. Among his other works were: "Ancient Mysteries Described" (8vo, 1823); an edition of Strutt's "Sports and Pastimes of the English;" and "Early Life and Conversion of William Hone."

HONESDALE, a borough and the capital of Wayne co., Pennsylvania, in the N. E. part of the state, at the confluence of the Lackawaxen and Dyberry creeks, 113 m. N. of Philadelphia, and 124 m. N. E. of Harrisburg; pop. in 1870, 2,654. It is situated on a branch of the Erie railway, 135 m. from New York, and the Delaware and Hudson canal connects it with the Hudson river at Kingston, N. Y. It is an active business place, the greater part of the coal mined by the Delaware and Hudson canal company being brought here from the Lackawanna coal fields, 16 m. distant, and transferred to canal boats and cars. It is neatly built, and has water and gas works, founderies, boot and shoe manufactories, tanneries, glass works, flouring mills, a national bank, a savings bank, and two weekly newspapers.

HONEY, the saccharine juices of plants, collected by bees from flowers, and deposited by them in the waxen cells of the comb. These juices undergo some modification in the honey bag of the bee; but though their chemical character is somewhat changed, they still retain the flavor and to some extent the peculiar properties of the plants from which they were collected. Under a powerful microscope the pollen that was mixed with the juices may be detected in the honey, and even referred to the particular kind of plant to which it belonged. The prevalence of certain varieties may determine what sort of localities have been most frequented by the bees. Flowers of sweet perfume impart agreeable odor and flavor to the honey; so that the product of some districts is famed and prized, while the bees of others, drawing upon very different sources, give to the honey they make the disagreeable or even dangerous properties of the plants themselves. Thus the honey of Mt. Ida in Crete has been always held in the highest estimation, as also that of Narbonne and Chamousi; but the honey of Trebizond causes

headache and vomiting, and possesses poisonous qualities, supposed to be derived from the rhododendron, *azalea Pontica*. The substances recognized in honey are grape sugar, manna, gum mucilage, extractive, a little wax, pollen, acid, and odoriferous substances. When allowed to drain from the comb it is wholly fluid, and this, as well as the superior quality first made in the season, and deposited in the upper part of the hives, is known as virgin honey. But as ordinarily pressed out it holds a solid crystalline sugar, which may be separated by draining and pressing the fluid portion through a linen bag. The sugar is believed to be identical with grape sugar; but excepting its consistency and tendency to crystallize, it is not apparently different from the fluid honey. Their taste and chemical properties are the same. The proportion of crystallizable sugar increases with the age of the honey, so as to give it in time a granular character. The consistency of honey is thus very variable. The best and newest of the spring season is a clear fluid contained in a white comb; older honey is yellowish and reddish. It is freely dissolved in cold water, and in this condition honey undergoes the vinous fermentation. Various substances are introduced into honey to add to its weight or to improve its color. Starch is most commonly employed, but chalk, plaster of Paris, and pipe clay are also used. The presence of such matters may be detected by dissolving some of the honey in warm water, and letting the mixture stand for the deposit to fall, when its character may be easily ascertained. The different sugars are also used as adulterants, the presence of all which may be detected either by microscopic observations directed to the forms and comparative sizes of the crystals, or to the presence of the sugar acari, or by the chemical tests also cited with the others by Dr. Hassall in his work, "Adulterations Detected." Starch sugar, possessing the same chemical properties as the sugar of honey, cannot be detected; but being often accompanied by sulphate of lime, resulting from the materials used in its preparation, the presence of this is an indication of adulteration with starch sugar. From the remotest times honey has been employed as an article of food; and to the ancients, in the absence of sugar, it was of greater importance than to the moderns. A land flowing with milk and honey was to them a region abounding in the chief necessities of life.—As an article of diet and of medicine, honey possesses the properties of sugar, and is perhaps more laxative. Many constitutions, especially those subject to dyspepsia, cannot resist its disordering tendency; but those accustomed to its use find it wholesome and agreeable. In medicine its use is principally as a vehicle for other more active substances; but its composition and action upon all constitutions being somewhat uncertain, a solution of pure sugar is generally preferred even for this purpose. When in

combination with vinegar, the preparations are called oxymels. Honey is easily clarified by heating it in a water bath till it becomes so fluid as to be readily strained through flannel. The wax and lighter impurities may be removed by skimming, while the heavier substances sink to the bottom.

HONEY ANT, a name given to several species of ants, of Mexico and Texas, the major workers of which secrete a saccharine fluid or kind of honey, which is used for the nourishment of the young brood. In the *myrmecocystus Mexicanus*, the abdomen of these workers becomes swollen like a balloon, and filled with a transparent honey; these individuals are inactive, not quitting the nest, their sole occupation being apparently the elaboration of this fluid, which they discharge into receptacles prepared to receive it. In *crematogaster inflatus* there is a bladder-like swelling on the hinder part of the thorax, furnished with small circular orifices at the posterior lateral angles, from which the saccharine fluid exudes.

HONEY BEE. See **BEE**.

HONEY DEW, a saccharine liquid found upon trees, and, when abundant, sprinkled upon the surface between them. This phenomenon has been the subject of much discussion; by some its origin is attributed to insects, and by others it is held that insects have no agency in the matter. It would appear that both parties are correct. That plant lice or aphides do excrete a saccharine liquid is a well established fact (see **APHIDS**), of which any one by careful observation can satisfy himself. On the other hand, it seems to be equally well established that sometimes this liquid is exuded by the leaves of trees, without any insect being concerned in the operation. What causes the plant to throw off sugar in this manner, and always upon the upper surface of the leaves, is a question needing further investigation. Dry weather is most favorable to its production; it is readily washed away by rains, and has been observed to reappear upon the same tree several times in succession. The production of honey dew is especially frequent upon linden trees. Bee-keepers regard this as of some importance as a source of honey, and ants and other insects are fond of it.

HONEY GUIDE, a bird of the cuckoo family, and genus *indicator* (Vieill.). The bill is short, broad at the base, with the culmen curved; wings long and pointed, with the first quill nearly as long as the third, fourth, and fifth, which are equal and longest; tail moderate, emarginate in the middle, and rounded on the sides; tarsi very short, covered with transverse broad scales; toes unequal, the outer anterior one the longest; claws moderate and strong. About ten species are described, inhabiting the wooded districts of Africa, India, and the Indian islands. It is about as large as a chaffinch, and flies chattering about the trees apparently in a state of great excitement in order to attract the traveller's atten-

tion; this effected, it flies in a certain direction toward the nearest wild bees' nest, now and then perching and looking back to see if the person follows; arriving at the tree or deserted ant hill containing the honey, it hovers over it, pointing toward it with the bill, and,



Honey Guide.

alighting on the nearest branch, anxiously and noisily awaits its share of the spoil. It sometimes attacks the nests on its own account when pressed for food, and is occasionally found dead within them, stung to death by the bees, and covered in by a vault of wax to prevent the inconveniences caused by decay. It will sometimes lead to two or three nests in succession. The natives of South Africa trust implicitly to their guidance in search of honey, and will leave almost any occupation to follow their course, uttering as they go several sentences which they believe have magic power. The unwary traveller, however, instead of wild honey sometimes finds a concealed crocodile or a crouching lion. Persons following it should answer its twitter by a constant whistle. The natives obtain the honey by first stupefying the bees by burning grass at the entrance of the nest. The flight of the bird is heavy, and for only short distances at a time; the nest is made in the holes of trees; the eggs are three or four, and both sexes assist in incubation; the birds are usually seen in pairs.

HONEY LOCUST, the common name for *Gleditsia triacanthos*, a leguminous tree, also called thorned acacia, found in the greatest abundance in the southwestern states, and sparingly in the Atlantic states from Pennsylvania to Florida. The tree grows to the height of 80 and even 100 ft., with branches spreading somewhat horizontally; the young stems are armed with stout, often triple thorns, and upon the trunk and larger branches are produced numerous clusters of long, much-branched thorns, which often give the tree a formidable aspect. These thorns are really branches suppressed in their development, and may frequently be seen asserting their real nature by bearing leaves. The foliage of the tree is exceedingly light and graceful; the leaves

are compound, 6 to 10 in. long, and of numerous leaflets which are less than an inch long. The small flowers are in racemes 1 to 2 in. long, and, as in most of the suborder to which it belongs (*Cesalpinieæ*), are not papilionaceous, but nearly regular; staminate and perfect flowers occur on the same tree; the fruit is a narrow flat pod, 1 to 2 ft. long, and so contorted as to have been compared to a large apple paring; the numerous hard brown seeds are imbedded in a pulp, which when the pods first ripen is sweet, but soon becomes sour; this pulp is much relished by swine and other domestic animals. The wood of the tree is hard and coarse-grained, and splits readily, but is not of much value except for fuel. As an ornamental tree the honey locust has its merits and demerits; while its foliage is too thin to afford a satisfactory shade, its graceful character and the very distinct habit of the tree render it useful in landscape gardening. It is not suited for a lawn tree or to be planted near dwellings, as accidents are liable to happen from its fierce thorns; the clusters of these, produced so abundantly upon the trunk, are often easily detached, and hidden in the grass may produce a serious wound upon the foot of the animal or person who treads upon them. There is a great difference in the thorniness of the specimens, the variety *inermis* being nearly thornless; in a quantity of seedlings plants almost without thorns may be found, and these should be selected for ornamental planting. The honey locust is chiefly valuable as a hedge plant. (See HEDGE.) In Illinois, and more

Honey Locust (*Gleditsia triacanthos*).

common southward, is found the water locust, *G. monosperma*, which has smaller thorns and an oval, one-seeded pod without any pulp; its timber is of even less value than that of the preceding.

HONEYSUCKLE, the name of several kinds of twining and erect shrubs of the genus *Lonicera*, in the order *caprifoliaceæ*. They have tubular

flowers, many of them possess fragrance, and most of them are ornamental and among the shrubs generally cultivated. The genus *Lonicera* was named in honor of Lonitzer, a German herbalist of the 16th century. The trumpet honeysuckle (*L. sempervirens*, Aiton) is



Trumpet Honeysuckle (*Lonicera sempervirens*).

found occasionally on rocky places in Massachusetts, more abundantly near New York, and thence to Virginia and southward. Under cultivation its foliage falls off toward winter. The flowers are numerous, with scentless corollas, of a scarlet or deep red color outside, and yellowish within. The plant is a strong and vigorous climber, continuing to bloom from spring until autumn; there is a variety with pale yellow blossoms. The American woodbine honeysuckle (*L. grata*, Ait.) is also cultivated and prized for its fragrant flowers, of a white color fading into yellowish, borne in whorls in the axils of the uppermost leaves. The yellow honeysuckle (*L. flava*, Sims), found in New York, Wisconsin, and southward, has long been cultivated. Its flowers are in closely approximate whorls, with corollas of a light yellow, deeply bilabiate, the tube hairy within, with a delicious fragrance. The small-flowered honeysuckle (*L. parviflora*, Lamarch) has little beauty to recommend it, it being a straggling bush 2 to 4 ft. high. It is found mostly in northern localities. A variety (*Douglasii*), with greener leaves and dull purple or crimson-colored corolla, occurs in the western states. The hairy honeysuckle (*L. hirsuta*, Eaton) has large, coarse, hairy leaves, and bright, orange-colored corollas, and is found from Maine to Wisconsin and northward. The English honeysuckle (*L. periclymenum*, Linn.) has its leaves all separate, deciduous, ovate, obtuse, attenuate at the base. Its flowers are in terminal heads, and are deep red externally; its berries are nearly globular, deep red, bitter, and nauseous. The Dutch honeysuckle is a variety of the English (*L. p. Belgica*), with

smooth purplish branches, and flowers reddish on the outside and yellowish within, of a very agreeable odor. It is sometimes called the monthly honeysuckle. The common honeysuckle is a native of England, and is there likewise called the woodbine, a corruption of woodbind, from its habit of winding itself around any tree or shrub within reach. It is a favorite plant with the poets, and often enters into their descriptions. The perfoliate honeysuckle (*L. caprifolium*, Linn.) has deciduous, obovate, acutish, glaucous leaves, the uppermost broader and connate, the flowers highly fragrant, 2 in. long, with a blush-colored tube. It ranges from the middle and south of Europe to Siberia, and is naturalized in England. *L. brachypoda*, a Japanese and Chinese species, also called *L. Japonica* and *L. Sinensis*, is now in very general cultivation; its oval or oblong leaves are nearly evergreen in the climate of New York, and quite so in milder localities; its flowers are neither very large nor showy, but very fragrant. The recently introduced *L. Hallii*, from Japan, is probably a form of this. A variety of it, called the golden Japanese honeysuckle (var. *aureo-reticulata*), has the leaves beautifully veined and variegated with yellow; being quite hardy, it is one of the most valuable ornamental climbers. The climbing honeysuckles are of easy cultivation, and are much used for covering porches, verandas, &c.; they are readily propagated by cuttings and by layers.—The fly honeysuckles, the upright or bush honeysuckles of the nurserymen, belong to a distinct section of *Lonicera*, and were formerly placed as a separate genus (*xylosteon*); they are distinguished by their bushy, non-climbing habit, single, axillary, two-flowered peduncles, with the two berries sometimes united into one. *L. cærulea*, *ciliata*, and *oblongifolia* are the native species in the northern states. *L. involucrata*, with its flowers surrounded by conspicuous leafy bracts, is a Californian species, which extends eastward to Lake Superior; it is sometimes seen in gardens, more as a curious than an elegant species. *L. Tartarica*, the Tartarian, is the most common bush honeysuckle of the gardens, and is ornamental whether for its abundant pink or white flowers or its red berries. The fragrant honeysuckle (*L. fragrantissima*), a native of China, puts forth in early spring, before the leaves, a profusion of pure white, highly odoriferous flowers. It is such an early bloomer that in the climate of New York its flowers are often caught by the frost; but it is worth cultivating even if the season is only now and then favorable to it. The name bush honeysuckle is also given to our native species of *Diervilla*; the shrub commonly called *Weigela* properly belongs to that genus also, and this and the native species will be treated under *WEIGELA*. Our native azaleas are frequently called honeysuckles. (See *AZALEA*.)

HONFLEUR, a seaport town of France, in the department of Calvados, on the S. bank of the

estuary of the Seine, here 7 m. wide, and nearly opposite Havre; pop. in 1866, 9,946. It has a commodious port, which is only accessible however at high tide, and is resorted to chiefly by fishing vessels and craft engaged in the timber trade. Its commerce, which was once important, is now engrossed by Havre, but it retains a trade in farm and dairy produce, large quantities of eggs, fruit, and vegetables being exported to England. It has fisheries of herring, cod, and mackerel, and manufacturing of lace, rope, leather, casks, mineral acids, and ship biscuit. Ship building is also carried on to some extent. The town is ill built and ill fortified, but contains some old and interesting edifices. The principal public buildings are the custom house, bank, and a chapel on a neighboring hill which is a favorite shrine for sailors. It contains a communal college, chamber of commerce, exchange, and school of navigation. Honfleur was long in the possession of the English, and figures largely in their French wars.

HONG, the Chinese name for a foreign factory or mercantile establishment. The word means a row or series, and is applied to warehouses because they consist of a succession of rooms. The factories at Canton are built in this manner, and each block is called by the natives a hong. Formerly the European trade at Canton on the part of the Chinese was granted by the government as a monopoly to 10 or 12 great merchants, called the hong merchants, through whose hands all foreign cargoes passed, and by whom the return cargoes were furnished. They became security for the payment of duties by the foreign ships, and maintained a high reputation for integrity. This monopoly is now abolished.

HONG KONG (Red Harbor), or **Hiang Kiang** (Fragrant Streams), a British colony in China, comprising the island of Hong Kong and a part of the peninsula of Kooloon on the mainland opposite. The island lies off the coast of the province of Kwangtung, on the E. side of the estuary of the Chu-kiang or Canton river, 35 m. E. of Macao and 75 m. S. E. of Canton; area, about 29 sq. m.; pop. in 1871, 124,193. The peninsula of Kooloon has an area of 5 sq. m. The island has a coast line of about 26 m., and is very irregular in shape, being indented by numerous bays. Two of the largest of these are on the S. E. side. Tytam bay, the most easterly one, extends 4 or 5 m. inland, forming two long peninsulas. Tytam peninsula, on its W. side, separates it from Stanley bay, at the head of which is the small town of Stanley. On the N. side the island is separated from the mainland by a narrow irregular strait, which at the Limoon pass at its E. end is only a quarter of a mile wide, and at Kooloon point a little more than a mile. At the W. end of this strait are Hong Kong road and Victoria bay, the latter a spacious harbor, having deep water close in shore and affording the best of anchorage. The surface of the is-

land is rugged and uneven, consisting of a range of barren granite rocks, running nearly E. and W., the highest of which is 1,825 ft. above the sea, broken by occasional narrow valleys, with a little level land along the beach. The natural vegetation is confined mostly to rank herbage and brushwood growing in the interstices of the rocks, and a few plants on the margins of the streams. There are no large trees. The mango, the orange, and the pear are indigenous, and the English have introduced the fruits of Canton and Macao. But a very small part of the island is susceptible of cultivation, scarcely enough to produce vegetables for the consumption of the inhabitants. Rice, sweet potatoes, and yams are raised by the natives, and potatoes and various European vegetables have been successfully grown. The island is abundantly supplied with good spring water. The climate is hot but comparatively healthy, although in some seasons there has been a large mortality from malaria. Of the population in 1871, 115,444 were Chinese, 5,933 Europeans and Americans, including the military and naval establishments, and 2,623 East Indians. The resident white population was only 2,736, of whom 1,367 were Portuguese, 869 English, 170 Germans, 133 Americans, and 60 French. —The chief settlement on the island is the city of Victoria, on the bay of the same name, in lat. 22° 16' 30" N., lon 114° 8' 30" E. Including the Chinese town, it extends 3 m. along the shore, occupying all the space between the water and the foot of the hills, and rising up the latter in terraces. The public buildings, which are of stone and brick, are superior to those usually seen in China. The houses of the merchants are large and elegant, with broad verandas and fine gardens. There are water works and gas works, and the main thoroughfare is protected by a sea wall. Among the public buildings are the government house, magistracy, court house, exchange, jail, ordinance and engineers' department, club house, and public offices. There are also a cathedral and bishop's palace, the chapel and school of the London missionary society, hospital of the medical missionary society, Morrison educational society, and seamen's and military hospitals. All the principal foreign nations have consulates. There are ten banking houses, one French, one local, and the rest English; two daily newspapers, one semi-weekly, one weekly, and one fortnightly, all English, and the weekly a government publication; one Portuguese weekly, and one in Chinese published every second day. Fine government gardens have been laid out, and much has been done of late to improve the appearance and the sanitary condition of the city. The population is about 95,000, of whom more than 90,000 are Chinese. Many of the latter are merchants, but the greater part are laborers and boatmen. About 13,000 of the poorer class live in boats in the harbor. The natives are not allowed to go abroad without a pass after

8 o'clock in the evening, but no restrictions are placed on the foreign population. The streets are guarded at night by a strong police force of Indian sepoy, and life and property are now secure. The government has paid considerable attention to education, and native schools have been established in Victoria and in other parts of the island. The village schools are purely Chinese, and use Chinese text books alone; but, owing to the extreme poverty of the people, only a fraction of the children attend them.—The administration of the colony is in the hands of a governor, aided by an executive council composed of the colonial secretary, the officer commanding the troops, and the attorney general. There is also a legislative council, over which the governor presides, composed of the chief justice, the colonial

secretary, the attorney general, the treasurer, the auditor general, the surveyor general, and four unofficial members nominated by the crown on the recommendation of the governor. Hong Kong is mainly a factory for British commerce with China and the headquarters for the British military and naval forces in China and Japan. It is a free port, and no dues are levied on goods or ships entering, discharging, or loading. The revenue is derived from land rents, licenses to sell opium and spirits, postage, taxes, fines, fees of office, &c., which generally more than cover the expenses of the administration. Since 1855 the colony has generally had a surplus above its expenditures. It pays at present £20,000 annually to the British government as a military contribution. Its total revenue in 1870 was £190,673,



Hong Kong.

and the expenditure £183,595. In 1871 the revenue was £175,920, of which £36,000 was derived from lands and rents, £40,000 from taxes, and £23,000 from the opium monopoly; expenditure, £186,273, of which a large portion was devoted to the maintenance of the police force. Hong Kong has now no public debt. Its commerce is chiefly with Great Britain, the United States, and Germany, the first absorbing about one half of the exports and imports. There are no official returns of values, but according to mercantile estimates, the imports average about £4,000,000 and the exports about £2,000,000. The principal imports are textile fabrics, mainly cotton goods, and the exports are mostly teas. The weights and measures both of China and of Great Britain are in general use. The money in circulation is the Mexican dollar, and the silver

dollar coined at Hong Kong, with the effigy of the British sovereign on one side and its name and value in Chinese characters on the reverse; and for smaller sums the usual Chinese coins. The new American dollar has been recently introduced, and meets with much favor.—Hong Kong was occupied by the British in 1841, and confirmed to them by the treaty of Nankin in 1842. The peninsula of Kooloon, which commands the N. side of Victoria harbor, was ceded in 1861. The population before the cession was only about 2,000, a poor and ignorant race, subsisting partly by fishing and partly by the cutting of building stone.

HONITON, a town of Devonshire, England, pleasantly situated on the left bank of the river Otter, 16 m. N. E. of Exeter, and 142 m. W. S. W. of London; pop. in 1871, 3,470. It is neatly built, and contains many good houses

and a literary institute. It gives its name to a celebrated kind of lace once exclusively made here, but now manufactured in many localities. Butter is largely exported to London. Honiton returned two members to parliament for many centuries till 1867, when it lost one member, owing to the population being less than 10,000, and it was subsequently disfranchised altogether.

HONOLULU, the capital of the Hawaiian islands, on the S. side of the island of Oahu, in lat. $21^{\circ} 18' 12''$ N., lon. $157^{\circ} 55'$ W.; pop. in 1872, 14,852. It covers the lower portion of Nuuanu valley, and extends over the raised coral reef at the base of the lofty mountains for several miles. The houses are usually of wood, seldom more than two stories high, with capacious verandas, and mostly surrounded with trees. The supply of water comes from a mountain stream, and is distributed by pipes

soil absorbs the water quickly, and miasmatic complaints are rare. The scenery about Honolulu is of the most charming tropical character, and there is a pleasant foreign society in the capital, principally American and English. The value of the imports at Honolulu in 1872 was \$1,583,583; more than half came from San Francisco, and a considerable portion from Oregon, England, and Germany. The value of the exports in 1872 was \$1,607,521, of which \$1,345,585 consisted of domestic produce, and \$204,836 of foreign merchandise re-exported. The total custom-house receipts in the same year were \$218,375. The number of American merchant vessels arriving was 86, of Hawaiian vessels 22, British 15, German 6, Norwegian and Italian each 3, Tahitian 2, Swedish 1; total, 138. Besides these, 47 whalers arrived. The arrivals from Pacific ports of the United States were 62, from Australia and New Zealand 26.

The number of national vessels was 7. A line of English mail steamers runs from San Francisco to Melbourne and Sydney, touching at Honolulu and the Feejee islands.—Honolulu harbor was discovered in 1794 by Capt. Brown of the English ship Butterworth, who, together with Capt. Gardner of the Prince Lee Boo, was murdered by the natives Jan. 1, 1795. The harbor is a deep basin in the coral reef which surrounds the island; it is secure at all seasons and under all winds, and has a depth of from $4\frac{1}{2}$ to 6 fathoms. The light-



Parliament House in Honolulu.

throughout the city. Honolulu is the residence of the king and of his government, and the centre of the chief interests of the islands. The principal public buildings are the parliament house, the treasury, the supreme court, the general post office, and the coral-built palace of the king. There are a hotel, a theatre, and a bank. American gold and silver coins are the standard currency. There are two American churches, established in 1833 and 1852, a Catholic cathedral, an Anglican church, established in 1862, and two considerable Hawaiian churches; two hospitals; numerous schools for native and foreign children; an academy called Oahu college, attended mainly by foreign youths; and three weekly and two monthly publications. The climate of Honolulu is remarkably mild and uniform; the extreme range of the thermometer is between 60° and 87° F. The rainfall is very irregular; in 1870 it was 59.51 in., and in 1871 40.09 in. The porous

house of the port stands on the inner edge of the reef, a mile from the wharves; it has a Fresnel light, 26 ft. above the sea, and visible from a deck 9 m. away. The wharves are substantial and capacious.

HONORIUS, the name of four popes and one antipope. **I.** Born in Capua toward the close of the 6th century, died in Rome, Oct. 12, 638. He was descended from a consular family, became in his youth a canon regular, and after the death of Boniface V. (624 or 625) was elected pope. In the beginning of his pontificate he encouraged the zeal of St. Paulinus of York for the conversion of the Northumbrians, sent into Britain St. Birinus, who converted the royal brothers Cyneigils and Cuichelm, and made the Irish and Scotch conform to the general law for the celebration of Easter. He also put an end to the 70 years' schism which had divided the churches of Is-tria. But what has rendered his name memo-

nable is his connection with the Monothelite heresy. The emperor Heraclius, for the purpose of conciliating the numerous Monophysite churches in the East, had encouraged the adoption of a dogmatic formula affirming that in Christ there was "only one mode of willing and working." This formula, recommended by Sergius, bishop of Constantinople, had been embodied by Cyrus, bishop of Alexandria, in the 7th article of what is known as the accommodation, a doctrinal compromise by which thousands of Monophysites were reconciled to the church. It was denounced in 634 by Sophronius, bishop of Jerusalem, in a circular letter to the bishops of Christendom containing a formal statement of the two distinct natures in Christ. Sergius on the reception of this letter wrote to Honorius detailing the good effected by the adoption of the formula, and urging him to put a stop to the controversy waged by Sophronius. Honorius replied, praising Sergius for discarding all novelties of expression, and saying that it is enough for us to know that the one person of the Mediator is the author of every act produced both in his divine and human natures. The self-same incarnate God, he says, manifests his divine power by miracles, and his human infirmity by enduring suffering and shame. There cannot be in the Saviour, born above the condition of our fallen nature, the struggle between the law of concupiscence in our members and the law of our minds; because he assumed our nature as it was created in innocence, not as it is vitiated by sin. "We should conform our wisdom and zeal to the divine oracles, and reject these new formulas which prove a stumbling block to the unwary. The little ones of the flock will consider us Nestorians if we persist in speaking of a twofold operation in Christ; and they will deem us Eutychians if we affirm only a single operation." In a second letter to Sergius, he says that he has written to the bishops of Alexandria and Jerusalem to abstain from speaking in this unusual way either of a single or of a twofold operation in Christ. The representative of Sophronius has pledged himself that his superior shall in future avoid the term "twofold operation," if Cyrus on his side refrains from using that of "single operation." The emperor Constans II. subsequently issued an edict called "Type" (*Τύπος τῆς Πίστews*), enjoining the same prudential silence; but it was condemned by Pope Martin I. in 649. The doctrine of Honorius was favorably explained, however, by Pope John IV. in 641, and by St. Maximus in 660, as well as by some bishops at the council of Constantinople in 680-81. But that council in the 13th session condemned both his letters to be burned, and in the 15th he was himself anathematized. His fault, according to Archbishop Manning, lay in not using his authority, when appealed to, by defining the true doctrine, and thereby repressing the incipient heresy. The question of his heterodoxy has been vehemently discussed in

ancient and modern times; and the dogma of pontifical infallibility, defined in 1870 by the council of the Vatican, has once more brought the name of Honorius prominently forward.—See Labbe's collection of the councils, vol. v., and *Collection royale or du Louvre*, vol. xv. (II.) **Pietro Cadalao**, *Cadalus*, or *Cadalouis*, antipope, died in 1072. He was bishop of Parma when he was nominated pope by the emperor Henry IV. in opposition to Alexander II. He was consecrated by the new bishop of Parma, Oct. 28, 1061, and immediately marched to Rome at the head of an army. He was excommunicated by the bishops of Germany and Italy in the council of Augsburg, 1062, and deposed by the council of Mantua in 1064. Although not recognized by any power but Germany, he maintained his claims to the papacy until his death. (II.) **Lamberto di Fagnano**, born in Bologna about 1070, died in Rome, Feb. 14, 1130. He was successively archdeacon of Bologna, canon regular of St. John Lateran, bishop of Velletri, cardinal bishop of Ostia, and legate to the emperor Henry V. He was elected pope under pressure of popular violence Dec. 15, 1124, but resigned, and was reelected unanimously on Dec. 21. From the beginning he labored incessantly for the correction of clerical abuses and the reform of manners. He had the reformatory decrees of the first Lateran council published and enforced in the synods of Westminster, September, 1125, and May, 1127, and in a synod of the Norman clergy at Rouen in October, 1128. In France he used the influence of St. Bernard to reform both clergy and laity, and called several councils: that of Nantes, for all Brittany, in 1127; that of Troyes, in 1128, at which the rule and white habits given to the templars by St. Bernard were approved; that of Paris, in 1129, for the restoration of monastic discipline; and that of Châlons-sur-Marne, in the same year, against simoniacs. The order of Prémontré was approved Feb. 16, 1126. In Germany and Italy the laws against simony were enforced by the papal legates. In the council of Worms, April, 1127, the simoniacal election of Godfrey, archbishop of Treves, was annulled; and in that of Ravenna the schismatic bishops of Aquileia and Grado were deposed. The Spanish bishops also assembled in Palencia in 1129, to apply to their churches the reforms ordered by the pope. Honorius, at the request of the kings of Denmark, Sweden, and Bohemia, sent legates to their respective countries to restore morality and discipline. In the East the provinces conquered by the crusaders were erected into bishoprics, and great efforts were made to unite the Greek and Latin churches. Honorius confirmed the election of the emperor Lothaire II., excommunicated his opponents Frederick and Conrad of Swabia, and deposed the archbishop of Milan for having crowned Conrad at Monza. He opposed by force of arms the claim of Roger of Sicily to Apulia and Calabria, but after a disastrous war sued for peace, Roger on his part

demanding of the pope the investiture of his kingdom. Eleven letters of Honorius II. are in vol. x. of Labbe's collection of the councils.

III. Cencio Savelli, born in Rome, died there, March 18, 1227. He was successively a canon regular of St. John Lateran, tutor to Frederick II., cardinal deacon, cardinal priest, chamberlain, and vice chancellor of the Roman church. He was elected pope in Perugia, July 18, 1216. One of his first cares was to enforce the laws of his predecessor Innocent III. for promoting clerical studies. He compelled the French to acknowledge Henry III. of England after the death of John, and interfered to secure the rights of Berengaria, widow of Richard I. On the day after his consecration he wrote to the king of Jerusalem and to the principal sovereigns, urging them to succor Palestine. He crowned Peter de Courtenay as emperor of Constantinople, April 9, 1217, and organized an army of crusaders under Andrew II., king of Hungary. In order to enlist the forces of Germany in the same cause, he negotiated with his former pupil, Frederick II., crowned his infant son king of the Romans in April, 1220, and Frederick himself as emperor in the following November, exacting at the coronation a solemn promise, which was not redeemed, to proceed to Palestine with an army within two years. Honorius induced Louis VIII. of France to undertake a crusade against Raymond of Toulouse, and persuaded the German princes to take up arms in defence of the new Christians of Prussia and Pomerania. His letters are published in Innocent Ciron's *Compilatio Epistolarum Decretalium Honorii III.* (Toulouse, 1645). **IV. Giacomo Savelli**, born in Rome, died there, April 3, 1287. He was educated in Paris, became a canon of Châlons-sur-Marne, and cardinal deacon of Santa Maria in Cosmedin. He was elected pope at Perugia, April 2, 1285, in violation of the constitution of Gregory X., without the formality of a conclave, which the new pope termed "a censurable abuse lately introduced into the Roman church." He endeavored without success to introduce the study of oriental languages into the university of Paris. Charles the Lame, heir to the kingdom of Sicily, being held a prisoner by Alfonso III. of Aragon, Honorius encouraged the French king, Philip the Bold, to make war on Aragon, bestowing for that purpose on the latter the tithe of all ecclesiastical revenues in France. He suppressed brigandage in his own states, and gave a great impulse to art and science. The letters of Honorius, preserved in Wadding's "Annals" and Ughelli's *Italia Sacra*, bear the stamp of wisdom and moderation; but contemporary historians reproach him with nepotism.

HONORIUS, Flavius, a Roman emperor of the West, second son of Theodosius the Great, born in Constantinople in September, 384, died in Ravenna in August, 423. On the death of his father in 395 he succeeded to the possession of the West, and resided during several years of

his minority at Milan, while his commander-in-chief and father-in-law Stilicho carried on the war against Alaric, king of the Visigoths. Stilicho was put to death in 408 on a charge of treason, and in 410 Rome was taken and plundered by Alaric. (See **STILICHO**, and **ALARIC**.) While insurrections broke out in many parts of the empire, and his general Constantius was able to protect only Italy and portions of the transalpine provinces, Honorius resided ingloriously in Ravenna. He was weak, vacillating, and stupid, and his long reign determined the downfall of the empire.

HONT, a N. W. county of Hungary, bounded S. by the Danube; area, 986 sq. m.; pop. in 1870, 123,800, of whom about 47,000 were Magyars and 57,000 Slavs, 76,000 Roman Catholics and 34,000 Protestants. In the north the county is traversed by ramifications of the Carpathians, gradually sloping southward to the Danube. The soil, particularly in the valleys, is generally fertile, producing large crops of grain, hemp, flax, and tobacco. Wine is also made to some extent. There are productive mines of gold, silver, lead, and iron, which have long been worked, particularly around Schemnitz. The capital is Ipolyisg, but the most important town is Schemnitz.

HONTHEIM, Johann Nicolaus von, a German juriconsult, born in Treves, Jan. 27, 1701, died at Montquintin in Luxemburg, Sept. 2, 1790. He was educated at the Jesuit school in Treves, studied jurisprudence at Louvain and Leyden, and became doctor of law in 1724. In 1728 he was appointed ecclesiastical counsellor of the consistory in Treves, in 1732 professor of civil law; and in 1748 he was made bishop of Myriophis in *partibus*, and suffragan of the see of Treves. He became favorably known for erudition, and published several works, the most famous of which is *De Statu Ecclesiæ et legitima Potestate Romani Pontificis* (4to, 1763), published under the pseudonyme of Justinus Febronius. In this work, which attracted great attention and was translated into French and Italian, he took ultra-Gallican or national views, and propounded a system of church government which has been called Febronianism. It was condemned in Germany and in France, as well as by Clement XIII., to whom it was dedicated, and drew forth a number of replies, the most noteworthy of which were those of Zaccaria and Ballerini. In 1778 the author issued a retraction, but this was followed by a commentary (1781) which threw doubts on his sincerity. His doctrines led to the congress at Ems; but as the French revolution swept away the Gallican church and the civil constitution of the clergy, Hontheim's ideas lay dormant until the present century, when they have been revived in the Old Catholic movement.

HOOD, a N. E. county of Texas, intersected by the Brazos river, and watered by numerous tributaries of that stream; area, 614 sq. m.; pop. in 1870, 2,685, of whom 97 were colored.

The surface is greatly diversified, being to a considerable extent broken and rugged, and consisting of mingled prairie and timber land. The highest point is Comanche peak, near the centre of the county, rising 600 ft. above the Brazos. The soil is a red or black sandy loam, and is very productive. Building stone is abundant. The chief productions in 1870 were 192,540 bushels of Indian corn, 11,352 of sweet potatoes, 45,155 lbs. of butter, and 779 bales of cotton. There were 3,442 horses, 3,348 milch cows, 16,098 other cattle, 2,453 sheep, and 10,452 swine. Capital, Granbury.

HOOD, John B., an American soldier, born in Bath co., Ky., about 1830. He graduated at West Point in 1853, and was mainly engaged in frontier service in Texas till 1859. He was severely wounded in an encounter with the Lipan and Comanche Indians, July 20, 1857, and was on leave of absence in 1860. He resigned his commission April 16, 1861, and entered the confederate army, in which he soon rose to the rank of major general. He took part in the Chickahominy campaign, and subsequently fought at the second battle of Bull Run, Antietam, and Fredericksburg. At Gettysburg, where he commanded a division of Longstreet's corps, he lost an arm on the second day of the battle. Rejoining the corps when it was sent to Georgia, he was at the battle of Chickamauga, where he lost a leg, and was made lieutenant general. He subsequently commanded a corps in the army of J. E. Johnston, whom he succeeded in July, 1864, and was thereafter in command of the confederate army in its operations against Gen. Sherman. After three bloody and unsuccessful attacks on that general before Atlanta (July 20, 22, 28), and the evacuation of that city (Sept. 1), he undertook a hazardous march northward, and fought another bloody battle at Franklin, Tenn. (Nov. 30), against Gen. Schofield, but suffered a crushing defeat near Nashville, from Gen. Thomas, Dec. 15-16, 1864, and soon after was relieved from his command, being succeeded by Gen. Richard Taylor.

HOOD, Robin, an English outlaw, supposed to have lived at the end of the 12th and beginning of the 13th century. The traditions concerning him are mostly embodied in the account given by Stow: "In this time (about the year 1190, in the reign of Richard I.) were many robbers and outlaws, among which Robin Hood and Little John, renowned thieves, continued in the woods, despoiling and robbing the goods of the rich. They killed none but such as would invade them, or by resistance for their own defence. The said Robert entertained an hundred tall men and good archers with such spoils and thefts as he got, upon whom 400 (were they never so strong) durst not give the onset. He suffered no woman to be oppressed, violated, or otherwise molested; poore men's goodes he spared, abundantlie relieving them with that which by theft he got from the abbeyes and the houses of rich old

carles; whom Maior (the historian) blameth for his rapine and theft, but of all the theeves he affirmeth him to be the prince, and the most gentle theefe." The researches of modern scholars, however, tend to make it a matter of doubt whether Robin Hood ever existed at all. No contemporary writer makes any mention of him, the first allusion to him by any historical writer being in the *Scotichronicon*, which was written partly by Fordun, canon of Aberdeen, between 1377 and 1384, and partly by Bower, abbot of St. Columba, about 1450. He is next mentioned by Major, in his *Historia Majoris Britanniae*, written in the early part of the 16th century. His most famous associates were "Little John," his chaplain Friar Tuck, who is supposed to have been a real monk, and his paramour Marian; and Sherwood forest, in Nottinghamshire, was the theatre of most of his exploits. Robin Hood is said to have been bled to death by a nun, his cousin, to whom he repaired for advice on account of her skill in medicine, and died at the nunnery of Kirkstrees, Yorkshire. An apocryphal epitaph at that place styles him Robert, earl of Huntingdon, and gives "24 Kal. Dekembris" (perhaps Dec. 24), 1247, as the date of his death. The exploits of Robin Hood were a favorite subject of ballad poetry as early as the time of Edward III., although many of these ballads, at least in their present shape, are comparatively modern. The "Lytel Geste of Robin Hood" was printed by Wynkin de Worde about 1495. A complete collection of the Robin Hood ballads, with "Historical Anecdotes," was published by Ritson (8vo, London, 1795), and enlarged by J. M. Gutch (2 vols. 8vo, 1847).

HOOD. I. Samuel, Viscount, a British admiral, born at Thorncombe, Devonshire, Dec. 12, 1724, died in Bath, Jan. 27, 1816. He was the son of the rector of his native place, entered the navy at the age of 16, and became post captain in 1756. In 1757 he was appointed to the command of the *Antelope*, a 50-gun ship, with which he captured a French vessel of equal size; and in 1759, having been transferred to the *Vestal* of 32 guns, and attached to the expedition sent against Quebec, he captured the French frigate *Bellona*, after a battle of four hours. On his return he was presented to George II., who gave him command of the *Africa* of 64 guns. He was present at the bombardment of Havre, was employed two years on the coast of Ireland, and during the remainder of the war under Sir Charles Saunders in the Mediterranean. From Nov. 14, 1768, to July 13, 1769, he was at Boston, then occupied by British troops, as "commander-in-chief of all the men-of-war in those parts." In 1778 he was made a baronet, and in 1780 rear admiral of the blue, with which rank he joined Rodney in the West Indies the same year. On April 28, 1781, he encountered De Grasse with a French fleet superior in numbers, but the latter avoided an engagement. He fought a

drawn battle with De Grasse during the same year near Chesapeake bay, but could not prevent its blockade nor the surrender of the British army. In the great battle of April 12, 1782, when De Grasse was defeated, Hood commanded the van division of the fleet under Rodney, and was in the same year created an Irish peer, under the title of Baron Hood. When the war with France commenced in 1793 he was sent to the Mediterranean to aid the royalists of the south, who surrendered Toulon to him. When the republicans under Bonaparte were about to regain possession of the place, which was no longer tenable, Hood destroyed the arsenal and dockyard, and 32 French ships, and withdrew with his fleet. In 1794 he expelled the French from Corsica and blockaded the port of Genoa. In 1796 he was raised to the English peerage as Viscount Hood of Whitley, and in 1799 became admiral of the red. **II. Alexander**, Viscount Bridport, brother of the preceding, born in 1727, died in Bath, May 3, 1814. He entered the naval service, and early became distinguished by the capture of two French vessels of war in two actions in Hyères bay in 1757. He passed rapidly through the lower grades, and in 1782, as rear admiral, was second in command of the fleet sent out under Lord Howe to relieve Gibraltar. In 1794 he contributed materially to Lord Howe's great victory with the channel fleet, his flag being hoisted on the Royal George, which sustained the hottest of the fire. In the same year he was created an Irish peer, under the title of Baron Bridport. In 1795 he attacked the French fleet of 12 ships of the line and 10 frigates, off Lorient, with an inferior force, and captured three sail of the line. For this he was in 1796 made a British peer as Baron Bridport, and in 1800 Viscount Bridport.

HOOD, Thomas, an English poet, born in London, May 23, 1798, died there, May 3, 1845. His father, who was a bookseller, died when he was but 12 years old. After acquiring the rudiments of an education, he was placed in a counting house; but the confinement of a mercantile life so affected his health that he was sent to Dundee to recruit, where mountain tramps and roving on the Tay restored his strength, but rendered him unwilling to resume a commercial life. He made his first literary attempts here, in the "Dundee Magazine," and after two years' residence returned to London and engaged himself to an uncle, to learn the art of engraving. He continued his attempts at versification, which attracted some attention, and in 1821 was made sub-editor of the "London Magazine," which had passed into the hands of some of his friends. Through this connection he became acquainted with Charles Lamb, Hartley Coleridge, De Quincey, Hazlitt, Bowring, Talfourd, Cary, Procter, and other literary men who were among the contributors. With Lamb he contracted an intimacy which was uninterrupted until the latter's death. Hood's first book, "Odes and

Addresses to Great People," was published anonymously, being in part the work of his brother-in-law J. H. Reynolds. In 1826 he published a collection of miscellaneous papers under the title of "Whims and Oddities." His "National Tales" appeared in 1827, and in the same year he published a volume of poems, including "The Plea of the Midsummer Fairies," "Hero and Leander," and "Lycus the Centaur," which were received with little interest by the public. Returning to his lighter and more popular style, he brought out a second series of "Whims and Oddities," which was followed in 1829 by a humorous poem called "The Epping Hunt." Hood edited the "Gem" for this year, and wrote for it his "Dream of Eugene Aram." In 1830 he began the publication of the "Comic Annual," which was continued through 10 volumes; and after an interruption of two years an 11th was issued in 1842. A selection of pieces from this work, with some additions, appeared in 12 monthly numbers in 1838-9, under the title of "Hood's Own." In 1831 he removed to a residence in Essex, called the Lake house, where he wrote his novel of "Tynney Hall," but pecuniary troubles compelled him to leave it in 1835. In 1837 he went to the continent for the benefit of his health, and remained abroad several years, publishing while in Belgium his "Up the Rhine," which was constructed on the groundwork of Smollett's "Humphrey Clinker." Returning to England, he became editor of the "New Monthly Magazine," from which he retired in 1843, collecting some of his contributions to its pages in a volume called "Whimsicalities." In 1844 he started "Hood's Magazine," which he continued to the time of his death; and in the same year appeared in "Punch" his "Song of the Shirt," composed, like the "Bridge of Sighs" and the "Lay of the Laborer," on a sick bed from which he never rose. About this time he received through the favor of Sir Robert Peel a pension of £100, which was continued after his death to his widow. The fullest collections of Hood's poems have been made in Boston, one edited by Epes Sargent (4 vols., 1856), and another in Prof. Child's edition of the British poets (4 vols., 1857). "Memorials of Thomas Hood, collected, arranged, and edited by his Daughter," appeared in 1860 (2 vols.), and "A Collection of the favorite Old Tales, told in Verse by Tom Hood," illustrated by Doré, in 1865 (4to).

HOOFD, Pieter Corneliszoon, a Dutch historian and poet, born in Amsterdam, March 16, 1581, died at the Hague, May 21, 1647. After finishing his education at Leyden, he spent three years in foreign travel, principally in France, Germany, and Italy, and returned to Amsterdam in 1601. In 1609 the stadtholder Maurice appointed him bailiff of Muiden and judge of Gooland, offices which he retained through life. He wrote, in the style of Tacitus, *Nederlandsche Historien* (2 vols., Amsterdam, 1642-'54). To acquire his style, Hooft is said to have read

Tacitus through 52 times. He also wrote a life of Henry IV. (1626), and a history of the house of Medici (1649). Among his poetical compositions are the tragedies *Gerard van Velzen*, *Baete*, and several minor pieces.

HOOGLY, a river of Bengal, British India, one of the deltoid mouths of the Ganges, formed by the junction, in lat. $23^{\circ} 25' N.$, lon. $88^{\circ} 22' E.$, of three branches of the Ganges. Its course is nearly S. with many windings, and it discharges its waters into the bay of Bengal by a broad estuary about 35 m. long and 15 m. wide at its mouth. The length of the Hoogly from the junction of its parent streams to the head of the estuary is 125 m. At Calcutta it is nearly a mile wide, and there is little increase in its size until it receives the Dummodah and Rupnarain, a short distance above its estuary. It is navigable by vessels of 1,400 tons as high as Calcutta, 100 m. from the bay, and ships of the line could formerly ascend to Chandernagore, 17 m. further. It is feared that the bed of the stream is being gradually filled up with mud and sand, and it has been proposed to construct a ship canal from Calcutta to the Mutwal, another mouth of the Ganges some distance E. The Hoogly is the only channel of the delta now frequented by large ships, though its mouth is obstructed by shoals. The Hindoos regard it as the true course of the sacred Ganges. The tidal phenomenon called the bore is often witnessed in it.

HOOGLY. I. A district of British India, in the province of Bengal, bounded N. by Burdwan, E. by the Hoogly, S. by the Rupnarain, and W. by Midnapore and Burdwan; area, 1,470 sq. m.; pop. in 1871, 1,491,621. The surface is low and flat in the east and hilly in the west and northwest. The principal streams are the Hoogly and its tributaries, the Dummodah, Rupnarain, and Dalkissore. The soil of the low lands is fertile, and in some places is impregnated with salt. The most important productions are rice, sugar cane, indigo, cotton, tobacco, mustard, oil seeds, ginger, potatoes, garden vegetables, and hemp. Silkworms are reared, and silk is one of the principal articles of export. **II.** The principal town of the district, situated on the right bank of the river of the same name, 22 m. above Calcutta, with which it has communication by the Calcutta and Burdwan railway; pop. about 12,000. It contains a fine church built by the Jesuits in 1599, and a college erected in 1836, in which both English and oriental branches are taught. This institution is supported by endowment from the estate of a wealthy Mohammedan. Hoogly, once an important city, is now of little note, having declined with the rise of Calcutta. The town was probably founded by the Portuguese in 1537. It was taken by Shah Jehan in 1632, when 1,000 Europeans were slaughtered and 4,400 made prisoners. The British established here in 1676 a factory, which, being fortified five years later, and furnished with a guard of 20 men,

became the first military establishment of the East India company in Bengal. The first action fought by the English in Bengal took place here in 1686, when the nawab's troops were defeated and 500 houses burned. In 1756 the town was captured by Surajah Dowlah, but was retaken in 1757 by Clive.

HOOK, Theodore Edward, an English author and journalist, born in London, Sept. 22, 1788, died in Fulham, Aug. 24, 1841. As a boy he showed extraordinary precocity. After a very inadequate education, terminating prematurely at Harrow, he rejoined his father, then musical director of Vauxhall gardens, and soon gave evidence of his talents by the production of several songs, for which he also composed the music; and when scarcely 16 he wrote a drama entitled "The Soldier's Return," which was well received. Elated by the extravagant praises of friends, he produced in rapid succession a number of farces and vandeilles, and at an age when most boys are at school was a successful dramatist, the wit of the greenroom, and the companion of actors and playwrights. Yielding to the fascinations of such a life, he gradually enlarged the circle of his admirers by his facile humor, his astonishing faculty of punning, the audacity of his practical jokes, and his brilliant powers of improvisation, until he was welcomed to the most aristocratic society of London, and even attracted the notice of the prince regent, who sent him in 1812 to Mauritius as accountant general and treasurer, with a salary of £2,000. In 1818 he was brought back to England as a prisoner under a charge of embezzling a sum of the public money estimated at £20,000, but which was subsequently reduced to £12,000. The law officer of the crown decided that there was no ground for a criminal prosecution, although his carelessness and incapacity were displayed to an extent almost incredible; and he was set at liberty and once more commenced the career of an author. In 1820 the "John Bull" newspaper was established in the interest of the king, for the purpose of crushing the supporters of Queen Caroline, and Hook's powers of satire and ridicule suggested him as a fit person to conduct it. He performed the task with great adroitness, and the circulation of the paper gave him a handsome income. In 1823 the government reasserted its claim against him, but after two years' confinement he procured a stay of proceedings, although he never made any attempt to discharge the debt. He was again welcomed to society, and to the close of his life remained a professed diner-out and wit. He employed his literary powers to some purpose, in the production of "Sayings and Doings," in three series, "Gilbert Gurney," "Maxwell," "Jack Brag," and a number of other novels. Fashionable dissipation, high living, hard drinking, the excitement of the gaming table, and the constant mental strain to which he was subjected, gradually undermined his constitution, and he ended his

career, to adopt his own words, "done up in purse, in mind, and in body." In 1849 appeared the "Life and Remains of Theodore Hook," by the Rev. Mr. Barham (2 vols. 8vo.).

HOOK, Walter Farquhar, an English clergyman, nephew of Theodore Hook, born in London in 1798. He graduated at Christchurch, Oxford, in 1821, and was successively curate at Whippingham, Isle of Wight, and in Birmingham, and vicar of Trinity church, Coventry, till 1837, when he was made vicar of Leeds. Here, during his incumbency of 22 years, 21 new churches, 32 parsonages, and more than 60 schools were erected in his parish, chiefly through his instrumentality. He was especially popular among the working classes. In 1859 he became dean of Chichester, and in 1862 a fellow of the royal society. He was appointed chaplain in ordinary to George IV. in 1827, and retained the office under William IV. and Victoria, preaching on the accession of the latter, from the text "Hear the church," a sermon of which more than 100,000 copies were sold in a month. He has published "An Ecclesiastical Biography" (8 vols., London, 1845-'52); "A Church Dictionary" (8th ed., 1859); "Sermons Suggested by the Miracles of our Lord" (2 vols., 1847); "Lives of the Archbishops of Canterbury" (9 vols. published, 1860 *et seq.*); and numerous pamphlets.

HOOKER, Nathaniel, a British historian, born in Ireland about 1690, died July 19, 1763. He lost his fortune in the South sea speculation, and was then engaged by the duchess of Marlborough to assist in writing her memoirs (1742), for £5,000. Being a zealous Catholic, he attempted her conversion, and a quarrel was the consequence. He was a friend of Pope, and brought a priest to hear the confession of the poet in his last hours. He wrote "The Roman History, from the Building of Rome to the Ruin of the Commonwealth" (4 vols. 4to, 1757-'71).

HOOKER, Robert, an English mathematician, born at Freshwater, Isle of Wight, July 18, 1635, died at Gresham college, London, March 3, 1703. His father, a clergyman, destined him for the church; but his health being too feeble for study, he devoted his leisure to invention. In 1655 he was appointed assistant in chemistry to Dr. Thomas Willis at Oxford, and in 1664 he became professor of geometry in Gresham college, and first Cutlerian professor of mechanics in the royal society. In 1666, having produced a model for the rebuilding of London after the great fire, he was appointed city surveyor; but his plan was not carried into execution. In 1677 he succeeded Oldenburg as secretary of the royal society. In 1691 he was made a doctor of physic by a warrant from Archbishop Tillotson. He made a practical improvement in the pendulum attached to clocks, causing it to swing in small arcs by the application of the recoil escapement. (See CLOCKS AND WATCHES, vol. iv., p. 698.) He also applied himself to devise means to regulate

watches, and when Huygens had some watches constructed, the balances of which were regulated by a spiral spring, Hooke accused Oldenburg, secretary to the royal society, of having communicated to strangers discoveries deposited in the society registers. But that the application is due to Huygens, is not only apparent from a perusal of the latter's description in his *Machinæ quædam et Mechanicæ* published in 1675, but is proved by other evidence. On the publication of Newton's *Principia*, he also claimed the previous discovery of the principle of gravitation. He was jealous of all other inventors, and was involved in continual disputes concerning different inventions, generally pretending that they were all taken from ideas of his own. He left numerous works, among which is his "Micrographia, or Physiological Descriptions of Minute Bodies made by Magnifying Glasses" (London, 1665). His "Posthumous Works, containing his Cutlerian Lectures and other Philosophical Discourses," was published in London in 1705.

HOOKER, Joseph, an American soldier, born at Hadley, Mass., in 1815. He graduated at West Point in 1837, served in the Florida war and in the war with Mexico, and was successively brevetted as captain, major, and lieutenant colonel for gallant and meritorious conduct in the battles of Monterey, the National Bridge, and Chapultepec. He was on leave of absence from 1851 to 1853, when he resigned his commission and became a farmer in California, serving also in 1858-'9 as superintendent of military roads in Oregon. He reentered the service at the beginning of the civil war, was appointed brigadier general of volunteers March 17, 1861, and was employed in the neighborhood of Washington till March, 1862, when he was placed in command of a division of the army of the Potomac. He was made major general of volunteers May 5, and took an active part in McClellan's peninsular campaign, especially at the battles of Williamsburg, Fair Oaks, Frazier's Farm, and Malvern Hill, and in the subsequent campaign at Bristoe Station, the second battle of Bull Run, Chantilly, South Mountain, and Antietam, where he was wounded. He was made brigadier general of the United States army Sept. 20, and at the battle of Fredericksburg commanded a grand division under Burnside. He succeeded Burnside in command of the army of the Potomac Jan. 26, 1863, and fought the battle of Chancellorsville in the beginning of May. On June 27 he resigned his command because Gen. Halleck would not consent to the evacuation of Harper's Ferry and the placing of the 10,000 men there under Hooker's orders, for a demonstration on Lee's rear, who was then invading Pennsylvania. He was succeeded by Gen. Meade. In September he was placed in command of the 12th and 13th army corps, which were concentrated about Chattanooga, and took a leading part in the series of battles fought there in November, commanding

in the action on Lookout mountain, for which he was made brevet major general. Subsequently, in command of the 20th army corps, styled the army of the Cumberland, he was prominent in the operations about Atlanta. He resigned the command of this corps in August, 1864, in consequence of a question of rank. In September he was placed in command of the Northern department, in 1865 of the department of the East, and in 1866 of that of the Lakes. He was mustered out of the volunteer service Sept. 1, 1866, and on Oct. 15, 1868, was made brevet major general of the United States army and retired from the service.

HOOKER, Joseph Dalton, an English botanist, son of Sir William Jackson Hooker, born in Glasgow in 1817. Having taken his degree in medicine, he devoted himself especially to botany. In 1839 he went as assistant surgeon on Sir James C. Ross's antarctic expedition, and in 1847 set out on a botanical exploration to the regions of the Himalaya mountains. In 1855, having previously served as botanist in the geological survey, he became assistant to his father, whom he succeeded in 1865 as director of the Kew gardens. In 1868 he presided over the meeting of the British association for the advancement of science. In 1867 he visited Morocco, and in company with Mr. Ball ascended several of the peaks of the Atlas chain; and in 1871, also in company with Mr. Ball, ascended the Jebel Tezah, one of the summits, more than 11,000 ft. high, which no European had before ascended. In 1873 he was elected president of the royal society. His principal works are: "*Flora Antarctica*" (2 vols., London, 1845-'8); "*Rhododendrons of the Sikkim Himalaya*" (1849-'51); "*Himalayan Journals*" (2 vols., 1854); "*Flora of New Zealand*" (2 vols., 1853-'5); "*Flora Tasmaniae*" (1855 *et seq.*); and "*The Student's Flora of the British Islands*" (1870). He has also published, with the coöperation of George Bentham, "*Genera Plantarum*" (vol. i., 1867; vol. ii., part i., 1873).

HOOKER, Richard, an English divine, born at Heavytree, near Exeter, in 1553 or 1554, died at Bishopsbourne, near Canterbury, Nov. 2, 1600. He became a scholar of Corpus Christi college, Oxford, in 1573, and a fellow and master of arts in 1577, was made deputy professor of Hebrew in 1579, was expelled from this office after three months with four other fellows of his college, but was immediately restored, and received holy orders in 1581. Being appointed to preach a sermon at St. Paul's cross, London, he lodged at the Shunamite's house, a dwelling appropriated to preachers, and was skilfully persuaded by the landlady "that it was best for him to have a wife that might prove a nurse to him, such an one as might prolong his life, and make it more comfortable, and such an one as she could and would provide for him if he thought fit to marry." The unsuspecting young divine agreed to abide by her choice, which fell upon her own daughter,

who proved to be, as Anthony Wood says, a "silly, clownish woman, and withal a mere Xantippe." Resigning his fellowship by his marriage, he was presented in 1584 to the living of Drayton-Beauchamp, Buckinghamshire. There he was visited by two of his former pupils, Edwin Sandys and George Cranmer, who found him reading Horace while tending the sheep in the field, his servant having gone to aid Mrs. Hooker in the household labors. On going with them to the house, he was called to rock the cradle, and the lady gave such other samples of hospitality as made them glad to depart on the following morning. To their expressions of commiseration Hooker replied: "If saints have usually a double share of the miseries of this life, I, that am none, ought not to repine at what my wise Creator hath appointed for me; but labor, as indeed I do daily, to submit to his will and possess my soul in patience and peace." Sandys made an appeal to his father, the archbishop of York, in behalf of his former tutor, who was promoted to the mastership of the Temple in London in 1585. The morning and afternoon lectureship belonged respectively to him and to Walter Travers, the one inclining to the Arminian view and maintaining the Anglican form of government, the other maintaining Calvinistic opinions and inclining to the Presbyterian form; and it was soon observed that "the forenoon sermons spoke Canterbury, and the afternoon Geneva." A controversy arose which was the occasion of Hooker's great work on "*Ecclesiastical Polity*." Archbishop Whitgift prohibited the preaching of Travers, who appealed unsuccessfully to the privy council, and published his memorial, which, though answered by his opponent, gained for him many powerful adherents. "To unbeguile and win over those of Mr. Travers's judgment, Hooker designed to write a sober deliberate treatise of the church's power to make canons for the use of ceremonies, and by law to impose an obedience to them as upon her children." To secure the requisite quiet, he requested to be translated to some country parsonage, and received in 1591 the rectory of Boscombe, Wiltshire, where he completed the first four books of the "*Ecclesiastical Polity*" (London, 1594). In the following year he was presented to the rectory of Bishopsbourne, Kent, where he passed the remainder of his life. The last four books were published at intervals, three of them posthumously, and the eight books were probably first collected in 1662, although some contend that all were published together as early as 1617. The sixth book is lost, that which passes for it having been proved to be a totally different production, and the eighth book seems to have been left incomplete. His life was written by Izaak Walton. The latest edition of his works was arranged by the Rev. John Keble (3d ed., 3 vols., Oxford, 1845).

HOOKER, Thomas, one of the founders of the colony of Connecticut, born in Markfield, Lei-

cestershire, England, in 1586, died in Hartford, Conn., July 7, 1647. He is supposed to have been a cousin of the preceding. After graduating at Emmanuel college, Cambridge, he took orders, preached in London, and was chosen lecturer at Chelmsford in 1626. Having been silenced by Laud for nonconformity, he established a grammar school at Little Baddow, near Chelmsford, in which John Eliot, "the apostle of the Indians," was an usher. In 1630, being still persecuted by the spiritual court, he went to Holland, where he preached at Delft and Rotterdam, being an assistant to Dr. Ames, who said of him that "he never met with his equal, either in preaching or disputation." In 1633 he came to New England with Cotton and Stone, and was settled with the latter at Newtown (now Cambridge), being ordained by the brethren of the church. In 1636 he removed with about 100 others to what is now Hartford, Conn., where he and Stone were the first ministers of the church. He was a remarkably animated and able preacher, commonly using no notes. Some 200 of his sermons were transcribed by John Higginson and sent to England, where about half of them were published. His most celebrated work, "A Survey of the Summe of Church Discipline," written in conjunction with John Cotton, was published in England under the supervision of Dr. Thomas Goodwin (4to, 1648). A memoir of his life, with a selection from his writings, has been published by the Rev. E. W. Hooker, D. D. (18mo, Boston, 1849).

HOOKER, Sir William Jackson, an English botanist, born in Norwich in 1785, died Aug. 12, 1865. He manifested a taste for botany at an unusually early age, and in 1809 he visited Iceland for the purpose of studying its natural history. The collection made with great pains during this visit was subsequently lost, but his copious notes and excellent memory enabled him to give an account of the botany of that region in his "Tour in Iceland in 1809" (Yarmouth, 1811; 2d ed., 2 vols. 8vo, London, 1813). He was subsequently engaged at different times in editing a continuation of Curtis's "Botanical Magazine," from 1830 to 1833 the "Botanical Miscellany," and from 1834 to 1851 the "London Journal of Botany." He was for a long time professor of botany in the university of Glasgow, and afterward became director of the royal gardens at Kew, in which post he was succeeded at his death by his son Joseph Dalton Hooker. He was knighted in 1836. Among his numerous works are: "British Jungermanniæ" (4to, London, 1816; 2d ed., 1846); "Muscologia Britannica" (1818; enlarged, 1855); "Flora Scotica" (1821); "The Exotic Flora" (3 vols., 1823-'7); "Icones Plantarum" (10 vols., 1836-'54); "Flora Boreali-Americana" (2 vols. 4to, 1829-'40); "British Flora" (1830; 7th ed., 1855); "Companion to the Botanical Magazine" (2 vols., 1835-'6); "Icones Filicum" (with the assistance of Greville, 1829-'31); "Botany of Capt.

Beechey's Voyage" (1831-'41); "Genera of Ferns" (1838-'42); "Notes on the Botany of the Antarctic Voyage of Sir James C. Ross" (1843); "Species Filicum" (3 vols., 1846-'53); "Guide to Kew Gardens" (1847); "Century of Orchidaceous Plants" (1846); "Victoria Regia" (1851); "Century of Ferns" (1854); "Filices Exoticae" (1859); "British Ferns," and "Second Century of Ferns" (1861); and "Garden Ferns" (1862).

HOOKER, Worthington, an American physician, born in Springfield, Mass., March 2, 1806, died in New Haven, Conn., Nov. 6, 1867. He received his academic education at Yale college, and graduated in medicine at Harvard university in 1829. He then settled in Norwich, Conn., where he practised his profession till 1852, when he was appointed professor of the theory and practice of medicine in the medical institution of Yale college, which post he held till his death. In 1864 he was chosen vice president of the American medical association. In 1849 he published a work entitled "Physician and Patient," which gained him a high reputation as a literary and medical scholar. In 1850 appeared his "Lessons from the History of Medical Delusions," the Rhode Island prize fund dissertation for that year. He made several important committee reports to the American medical association, and was the author of a valuable series of books on physiology, natural history, chemistry, &c., for the use of the young.

HOOLE, John, an English translator, born in London in 1727, died near Dorking, Aug. 2, 1803. At the age of 17 he was placed as a clerk in the East India house, where he remained nearly 40 years. He published translations of the "Jerusalem Delivered" (2 vols. 8vo, 1763) and "Rinaldo" (1792) of Tasso, the dramas of Metastasio (2 vols. 12mo, 1767), and the "Orlando Furioso" of Ariosto (5 vols. 8vo, 1773-'83). Sir Walter Scott speaks of Hoole as "a noble transmuter of gold into lead," and Southey alludes to the translation of the Orlando as "that vile version of Hoole's." His dramatic works were three tragedies, "Cyrus," "Timanthes," and "Cleonice, Princess of Babylon," all of which failed.

HOOPER, John, an English prelate, born in Somersetshire about 1495, executed in Gloucester, Feb. 9, 1555. He was educated at Oxford, and became a Cistercian monk. Returning to Oxford, he embraced the doctrines of the reformation, but in 1539 accepted the appointment of chaplain to Sir John Arundel, which he was obliged to relinquish when his Protestant views were discovered. He then went to France, and afterward returned secretly to England; but being recognized he escaped to Ireland, and thence passed over to the continent, remaining in Switzerland until the accession of Edward VI., when he went back to England and preached the reformation in London. In 1550 he was nominated to the see of Gloucester, but refusing to wear the episcopal robes or

to swear obedience to the metropolitan, and declaiming violently from the pulpit against the habits, the ordinal, and the council, he was imprisoned in the Fleet, Jan. 27, 1551. After two months' confinement his objections were overcome. Fourteen months later he received the bishopric of Worcester *in commendam*, in addition to that of Gloucester. On the accession of Queen Mary he was one of the first to suffer. He was deprived of his see, and in July, 1553, was cast into the Fleet prison. On Jan. 28, 1555, he was summoned with five other reformed clergymen before a spiritual court over which Gardiner presided. One of the prisoners recanted; one begged for time; Hooper, Rogers, Saunders, and Taylor replied that their consciences forbade them to subscribe to the doctrines established by law, and they were consequently excommunicated and condemned to the stake. Hooper met his fate with firmness. A collection of his works in 2 vols. 8vo was issued by the Parker society in 1843 and 1852.

HOOPER, William, one of the signers of the American Declaration of Independence, born in Boston, June 17, 1742, died in Hillsborough, N. C., in October, 1790. He graduated at Harvard college in 1760, studied law with James Otis in Boston, and removed to Wilmington, N. C., in 1767, where he soon rose to eminence. He was delegated to the continental congress in 1775, and was till his death a leader in the councils of North Carolina.

HOOPING COUGH. See WHOOPING COUGH.

HOPOE, a tenuirostral bird of the order *passeres* and family *upupidae*. The family includes the subfamilies *upupinae* or hoopoes, and *epimachinae* or plumed birds of New Zealand and Australia; the former comprise the genera *upupa* (Linn.), *irrisor* (Less.) of Africa, and *fulculia* (Geoffr.) of Madagascar. The genus *upupa* is characterized by a long, slender, slightly curved bill, with acute tip; wings long and rounded, the fourth and fifth quills equal and longest; tail long, broad, and even; tarsi shorter than middle toe and strong, and toes moderate. About half a dozen species are described in Europe, Asia, and Africa; they are migratory, preferring moist places on the border of woods; their food consists of insects, worms, and caterpillars, which they seek on the ground and among the foliage; their flight is very undulating, and on this their principal safety from birds of prey depends; the nest is made in the holes of trees and crevices of rocks, and is composed of dried grasses lined with softer materials; the eggs are four or five in number. These birds sometimes congregate in small flocks. The tenuirostral tribe, which includes the humming and sun birds, the birds of paradise, the honey suckers, and other brilliant species, belongs almost entirely to tropical climates. The hoopoe, however (*U. epops*, Linn.), is found even in northern Europe, whither it comes in summer from Asia and northern Africa. The bird is about the size of

a thrush; the head, neck, back, and breast are reddish gray, with tints of vinous purple, shading into pure white on the belly and vent, where the centre of the feathers is dashed with dark brown; the rump is white; the wings black, when closed exhibiting five white bands;



Hoopoe (*Upupa epops*).

tail black, with an angular white band across the centre, and the outer feather narrowly edged with the same; there is an ample crest of erectile feathers, of an orange brown color of varying intensity, nearly white at the end, with a terminal oval black spot. The female is less bright, and her crest is smaller. It is a handsome and sprightly bird, and useful in destroying larvae and insects.

HOORN, a town of the Netherlands, in the province of North Holland, on a bay of the Zuyder Zee, 21 m. N. N. E. of Amsterdam; pop. in 1868, 9,503. It has 10 churches, a Latin school, a school of design, a house of correction, considerable navigation, and manufactories of gold and silver ware. A brisk trade is carried on in corn, cattle, cheese, and butter. The former fortifications have been converted into promenades.

HOORNE. See HORN, PHILIP.

HOOSAC TUNNEL. See TUNNEL.

HOP (Ger. *Hopfen*), *humulus lupulus*, a plant which with *cannabis*, the hemp, composes the order *cannabineae*; this is by some botanists regarded as a suborder of the nettle family, the *urticaceae*. The plant is dioecious; the flowers are apetalous; the staminate ones have five sepals and as many stamens; they are in loose axillary panicles; the fertile flowers are in short catkins of leafy scales, each of which has two flowers; calyx of a single sepal embracing the ovary, which has a style with two stigmas, and in ripening becomes a one-seeded fruit or achene. In maturing, the scales of the catkin increase much in size and form a membranaceous cone or strobile; they

are covered at their base with an aromatic resinous substance of yellowish color, known as lupuline. This constitutes about one sixth of the weight of the dried catkins, and contains the greater portion of their valuable qualities. The hop is a vine, with a perennial root from

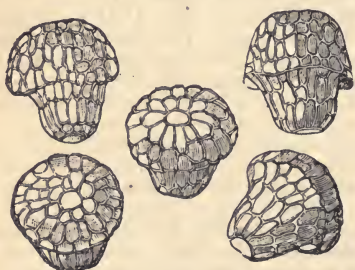


Hop (*Humulus lupulus*).

which spring up numerous annual shoots, forming slender flexible stems, angular and rough to the touch. These climb spirally upon trees or around poles to the height of 20 or 30 ft. The leaves are opposite on long petioles, heart-shaped, and three- or five-lobed. The hop is found wild in America, Europe, and Asia. It has long been cultivated in Germany, where its use is traced back as far as the 9th century. In other countries it has become an important agricultural product, and in the United States is now largely cultivated; portions of New York and Wisconsin are the largest hop-growing sections, but considerable quantities are produced in other states; hops are an article of both export and import. The English, who have carried its culture to great perfection, first engaged in it in the reign of Henry VIII., about the year 1524, having learned from people of Artois its qualities of preserving beer from fermentation and imparting an agreeable bitter flavor to the liquor. Previous to the introduction of hops, various bitter herbs were used in beer, especially the alehoof or ground ivy, *glechoma hederacea*, and the use of hops was strongly protested against. The S. E. part of England is particularly favorable for the crop; and in the county of Kent alone from 25,000 to 30,000 acres have long been appropriated to it. Hop plantations are also found in other counties; but the production of Kent probably represents one half of the whole amount raised in England. In ordinary seasons this county supplies nearly enough hops for all the malt liquors brewed in England; but the crop is very fluctuating, and in seasons of scarcity hops are imported from Belgium and the United States. The Belgian hops have a good reputation; but

those of Bavaria are the best of all, the aroma being more perfectly preserved by the method of preparation in practice there. The American hops are not so highly esteemed in England as those raised there, and bring a lower price. Several varieties are known to cultivators, such as the English cluster, grape, Pompey, and others, the first named being considered the best. The situations selected for hop yards are the sunny slopes of hills, or wherever there is a free circulation of air. Such soil as will produce a good crop of Indian corn is suited to hops, but it is essential that it be naturally or artificially drained, as success is impossible on a wet soil. The planting is done with "sets," which are the underground stems of old vines cut into pieces of two or three joints. The plant being dioecious, 8 or 12 male hills are equally distributed in each acre. The hills are marked out from 7 to 10 ft. apart, and from three to five sets are planted in a hill. The plants are well cultivated the first year, the vines being allowed to spread upon the ground. The second spring, two poles 16 to 20 ft. long are set to each hill, and the vines as they grow are assisted, if need be, to twine upon the poles, the crop being kept clear of weeds. Hops are subject to blight of various kinds from mould or rust, and the devastation of an aphid or louse. This insect probably destroys more than half the crops, and much of the remainder is lost by unfavorable seasons and other causes. When the hops are mature, the poles are pulled up with the vines hanging to them, and women and children gather the strobiles, which are immediately carried to the kilns, called hop oasts, in which they are dried upon a floor of wire or hair cloth at a heat not exceeding 180° F. Fumes of burning sulphur are admitted to the hops while drying, by which they are partially bleached. They are then packed tightly in bags or pockets with the aid of a press, and the parcels are made so compact that they may be cut into blocks with a knife. The bales may be kept for years in a dry airy situation. The Belgians follow the same practice; but the Bavarians, when the hops are ripe, cut off the plants close to the ground, and leave them upon the poles to dry in the sun. This is thought to preserve better the aroma, and the hops, though packed loosely in bags, have more strength and flavor than the English or Belgian. Several years ago a plan for training hops on strings or wires was patented under the name of the horizontal hop yard. One pole about 7 ft. high is placed at each hill, and the tops of the poles are connected by twine stretched across the yard in two directions; it is made fast to the end poles in each row and wound once around the tops of the others. When the hops are ripe for picking, the strings are loosened, and as many removed as may be convenient for the pickers. The quality of hops is judged of by the weight of the bags, the heavier samples having more of the lupuline or hop dust, 1 lb. of

which is considered equal to 4 lbs. of the strobiles deprived of it. They should be of a clear bright color, free from greenish particles, but full of hard seeds and lupuline, and become sticky with the heat of the hand. Being greatly injured by dampness, the presence of a crust thereby produced should be particularly looked for. The essential properties of the hop, its bitterness and fragrance, appear to reside in the lupuline; this was for a long time supposed to be the pollen of the hop, but it is found only on the pistillate catkins, and consists of peculiar glands attached to the base of the scales; their appearance when magnified is shown in the engraving. This substance was noticed by Sir J. E. Smith of England and M. Planché of France, and its properties were investigated by Dr. A. W. Ives of New York. When hops are shaken in a coarse bag a fine yellow powder passes through, which is shown to be of a resinous character by its agglutinating under a moderate heat, and burning with a white flame. Dr. Ives called this substance lupuline, but this name is more properly applicable to the bitter principle it contains. In 120 grains he found 5



Lupuline Grains, highly magnified.

of tannin, 10 of extractive, 11 of bitter principle, 12 of wax, 36 of resin, and 46 of lignine. A volatile oil also has been separated by Payen and Chevallier, by distillation of the lupuline. This oil is yellowish, and has an acrid taste with the odor of hops. The oil and the bitter principle impart the virtues of the hops to water and alcohol. The separation of the resinous powder and its use in commerce instead of the hops was strongly recommended by Dr. Ives, on the score of economy in saving transportation, handling of bulky materials, and absorption of wort.—Besides their use for preserving and flavoring malt liquors, hops have a reputation in medical practice as a tonic. Their efficacy depends both upon the bitter principle and, to a less degree, the volatile oil. The effect of the former is chiefly obtained from malt liquors, where it is of course much modified by the alcohol and other constituents. The tincture of hops and tincture of lupuline are preparations in which the alcohol they contain is more active than the hops. The narcotic and sedative effects of hops and lupuline are very slight, and to be obtained

chiefly from large doses of the latter preparation. A hop pillow is however sometimes used to promote sleep, and hop poultices and fomentations are occasionally employed. It is very probable, however, that any supposed specific effect from the hops is largely due to the imagination. Pills of lupuline may be prepared by rubbing the powder in a warm mortar until it becomes plastic, and then working it into pills; these may be given in doses of 6 to 12 grains. In hop-growing countries the young shoots are often blanched by covering with earth, and are highly esteemed as a table delicacy, being prepared like asparagus. The fibres of the vine are strong and flexible, and have been woven into coarse cloth, which served for the sacks in which the hops are carried to market. Hop vines are one of the many substances that have recently been proposed as a stock for paper makers.—The production of hops in the United States has increased from 3,497,029 lbs. in 1850 to 10,991,996 lbs. in 1860, and 25,456,669 in 1870. Of the last amount, New York produced 17,558,681 lbs., Wisconsin 4,630,155, Michigan 823,269, California 625,064, and Vermont 527,927. In 1872 there were under cultivation in Great Britain and Ireland 61,927 acres of hops. The imports for that year amounted to 135,965 cwt., valued at £679,276, of which 66,930 cwt., worth £297,034, were from Belgium, and 36,612 cwt., valued at £221,617, from Germany.

HOPE. I. Thomas, an English author, born about 1770, died Feb. 3, 1831. He inherited a large fortune, and at the age of 18 started on a tour in Europe and the East. After an absence of eight years he returned to London, and purchased a house which he remodelled and furnished according to ideas formed on his travels. A distinguishing feature was the long galleries and the series of cabinets stored with pictures, statuary, and objects of art and *virtù*. In 1807 he published "Household Furniture and External Decorations," with 60 plates, in which a full description of his own establishment is given, with hints for the decoration of houses. In 1809 appeared his "Costume of the Ancients" (2 vols. 8vo; 3d ed. with additions, 1841), a magnificent work, containing 321 plates, followed in 1812 by "Designs of Modern Costume." In 1819 he published a novel, "Anastasius, or Memoirs of a Modern Greek, written at the close of the 18th Century." This was at the time attributed to Byron, and created a great sensation, but is now seldom read. Shortly after his death two posthumous works were published: "Essay on the Origin and Prospects of Man" (3 vols., 1831), and a "Historical Essay on Architecture" (2 vols., 1837), which has passed through several editions. He was a liberal patron of art, being the first to discover and appreciate the genius of Thorwaldsen, who executed for him his "Jason;" and he collected one of the finest private galleries of pictures in Europe.

His wife, who was the daughter of Lord Decies, archbishop of Tuam, was of remarkable beauty, and was remarried after his death to Viscount Beresford. She died in 1851.—His eldest son, HENRY THOMAS HOPE of Deepdene (died 1862), was a well known conservative politician, and was M. P. for Gloucester. **II. Alexander James Beresford Beresford-Hope**, son of the preceding, born in 1820. He assumed his mother's name Beresford by royal license in 1854. He was a member of parliament for Maidstone from 1841 to 1852, and was reelected in 1857. In 1865 he was elected for Stoke-upon Trent, and in 1868 for the university of Cambridge, for which he was reelected in 1874. In 1865-'7 he was president of the royal institute of British architects. He is the author of "Essays" (London, 1844), "Letters on Church Matters, by D. C. L.," "The English Cathedral of the Nineteenth Century," and numerous pamphlets and articles; and is celebrated for his munificent restoration and endowment of St. Augustine's abbey, Canterbury, as a church of English missionary college.

HOPE, Thomas Charles, a Scottish chemist, born in Edinburgh, July 21, 1766, died there, June 13, 1844. His father, Dr. John Hope, was professor of botany in the university of Edinburgh. In 1787 the son was appointed to the chemical chair in the university of Glasgow. About the same time he became a convert to Lavoisier's theory of combustion and oxygenation, and was the first British chemist who publicly taught it. In 1795 he became assistant to Dr. Black, professor of chemistry at Edinburgh, upon whose death in 1799 he succeeded to the chair, which he filled until the end of the session of 1843. As a teacher and lecturer he had few equals. His principal discovery was the presence of a new earth, named by him strontine, in a mineral found in the strontian lead mines in Argyleshire.

HOPE AND COMPANY, a firm of Amsterdam bankers, established in the 17th century by Henry Hope, a Scottish gentleman. One of the leading members of the house in the early part of this century, when it was in the zenith of its prosperity, was Henry Hope, who was born in the United States, the son of a Scottish loyalist who had settled in Boston. This Henry Hope lived some time in Quincy, Mass., and was a poor youth when he emigrated from that place to England in the latter part of the 18th century. Mr. John Williams, an Englishman, who married his niece, and who assumed the name of John Williams Hope, and afterward that of John Hope, was the manager of the establishment. Among the silent partners were Adrian Hope, Henry Philip Hope, and Thomas Hope, the author of "Anastasius." The ablest active partner was Peter Cæsar Labouchere, who entered the house in the capacity of a clerk, and who married in 1796 a daughter of Sir Francis Baring. The relationship with the Baring family was continued by his son, the late Lord Taunton, whose first wife was

a daughter of Sir Thomas Baring. In concert with the house of Baring, the Hopes negotiated the great loan with France after the withdrawal of the allied armies, and several other loans. The governments with which the house of Hope entertain the most intimate financial relations are those of Holland and Russia. The Hope certificates, as the stocks are called, which the Russian government gave to the Dutch bankers in acknowledgment of its debt, amount to about \$25,000,000. A splendid villa built in 1782 for one of the Hopes near Haarlem, at a cost of \$200,000, was purchased by Louis Bonaparte, and now belongs to the Orange dynasty. The present representative of the family is Adrian Elias Hope, born April 8, 1845, the son of Adrian John Hope.

HOPKINS. I. A N. E. county of Texas, bounded N. by the S. fork of Sulphur river, and drained by White Oak bayou and Lake fork of the Sabine; area, about 800 sq. m.; pop. in 1870, 12,651, of whom 1,620 were colored. About half of it is timbered and half prairie land. The chief productions in 1870 were 340,676 bushels of Indian corn, 44,872 of sweet potatoes, 25,549 lbs. of wool, 108,884 of butter, and 5,417 bales of cotton. There were 6,210 horses, 6,381 milch cows, 1,571 working oxen, 14,916 other cattle, 10,675 sheep, and 23,747 swine. Capital, Sulphur Springs. **II.** A W. county of Kentucky, bounded N. E. by Green river, E. by Pond river, and S. W. by Trade-water creek; area, 474 sq. m.; pop. in 1870, 13,827, of whom 1,869 were colored. It has a fertile soil and an uneven surface, diversified by hills which contain iron ore. Anthracite coal is also found. The St. Louis and South-eastern and the Elizabethtown and Paducah railroads pass through it. The chief productions in 1870 were 25,506 bushels of wheat, 464,879 of Indian corn, 48,240 of oats, 3,012,053 lbs. of tobacco, 24,849 of wool, and 114,798 of butter. There were 3,511 horses, 1,428 mules and asses, 6,554 cattle, 14,619 sheep, and 22,892 swine. Capital, Madisonville.

HOPKINS, Edward, governor of the colony of Connecticut, born in Shrewsbury, England, in 1600, died in London in March, 1657. He was a prominent merchant of London, and came to Boston in 1637, but soon after removed to Hartford, where he was chosen a magistrate in 1639, and governor of the colony every other year from 1640 to 1654, alternating with Haynes. He aided in forming the union of the New England colonies in 1643. On the death of his elder brother he went back to England, and became warden of the English fleet, commissioner of the admiralty and navy, and member of parliament. But he never lost his interest in the colonies, and at his death bequeathed much of his estate to New England, giving £1,000 for the support of grammar schools in Hartford and New Haven, which are still kept up, and £500 which was assigned to Harvard college and the grammar school at Cambridge.

HOPKINS, Essek, an American naval officer, born in Scituate, R. I., in 1718, died in North Providence, Feb. 26, 1802. On the breaking out of the revolutionary war he was commissioned by Gov. Cooke as brigadier general. On Dec. 22, 1775, he received a commission from the continental congress as commodore and "commander-in-chief" of the navy. He was officially addressed by Washington as Admiral Hopkins. In February, 1776, he put to sea with the first squadron sent out by the colonies, consisting of four ships and three sloops. The fleet sailed for the Bahama islands, and captured the forts at New Providence, with 80 cannon, and a large quantity of ordnance stores and ammunition. On his return, when off Block island, Hopkins took the British schooner Hawke and the bomb brig Bolton. For this act the president of congress complimented him officially. Two days afterward, with three vessels, he attacked the Glasgow, of 29 guns; but she escaped, and for this he was censured. In June, 1776, he was ordered by congress to appear before the naval committee to reply to charges which had been preferred against him for not annoying the enemy's ships on the southern coast. He was defended by John Adams, and was acquitted. The unavoidable delays at a later period in getting his ships ready for sea gave another chance for his enemies to complain; and neglecting a citation to appear at Philadelphia, he was dismissed the service, Jan. 2, 1777. He resided near Providence, and exerted during a long life a great political influence in Rhode Island, being often elected to the general assembly of that state.

HOPKINS, John Henry, an American bishop, born in Dublin, Jan. 30, 1792, died at Rock Point, Vt., Jan. 9, 1868. He came to America with his parents in 1800, and was intended for the law; but after receiving a classical education he passed a year in a counting room in Philadelphia, assisted Wilson the ornithologist in the preparation of the plates to the first four volumes of his work, and about 1810 embarked in the manufacture of iron in the western part of Pennsylvania. The iron business was prostrated by the peace of 1815, and in October, 1817, he quitted it bankrupt in property, and after six months' study was admitted to the bar in Pittsburgh; but in 1823 he left the bar for the ministry, and in 1824 became rector of Trinity church, Pittsburgh. A new building being needed, he became its architect, studying Gothic architecture for the purpose. In 1826 he was sent as clerical deputy to the general convention, and again in 1829, taking in both a prominent part in the debates. In 1831 he accepted a call to Trinity church, Boston, as assistant minister. A theological seminary was at the same time established in the diocese of Massachusetts, in which he became professor of systematic divinity. In 1832 he was elected the first bishop of Vermont, and was consecrated in New York, Oct. 31. He

immediately proceeded to his diocese, accepting at the same time the rectorship of St. Paul's church, Burlington. He soon began a boys' school, and in erecting the needed buildings became involved to a degree which resulted in the sacrifice of his property. He resigned his rectorship in 1856, in order to devote himself to the work of the diocese, and the building up at Burlington of the "Vermont Episcopal Institute." Besides pamphlets, sermons, and addresses, he published "Christianity Vindicated, in a Series of Seven Discourses on the External Evidences of the New Testament" (Burlington, 1833); "The Primitive Creed Examined and Explained" (1834); "The Primitive Church compared with the Protestant Episcopal Church of the Present Day" (1835); "Essay on Gothic Architecture" (1836); "The Church of Rome in her Primitive Purity, compared with the Church of Rome at the Present Day" (1837); "Twelve Canzonets," words and music (New York, 1839); "The Novelties which Disturb our Peace" (Philadelphia, 1844); "Causes, Principles, and Results of the British Reformation" (Philadelphia, 1844); "History of the Confessional" (New York, 1850); "A Refutation of Milner's 'End of Controversy,' in a Series of Letters" (2 vols., 1854); "The American Citizen, his Rights and Duties" (1857); "A Scriptural, Ecclesiastical, and Historical View of Slavery," sustaining that institution (1864); "History of the Church in Verse" (1866); "Law of Ritualism Examined" (1867); and "Candid Examination whether the Pope is the Great Antichrist of Scripture" (1869). He was a strong champion of the high-church party. He took a prominent part in the Pan-Anglican synod at Lambeth (1867), and received from Oxford the degree of D. C. L.

HOPKINS, Lemuel, an American poet, born in Waterbury, Conn., June 19, 1750, died in Hartford, April 14, 1801. He practised medicine at Litchfield from 1776 to 1784, when he removed to Hartford. He was singular in his appearance, manners, and opinions; in his early days an admirer of the French philosophers, but in his later years a diligent student of the Bible. He is said to have written for Barlow the version of the 137th psalm beginning, "Along the banks where Babel's current flows." Among his poems, the best known are "The Hypocrite's Hope" and an elegy on "The Victim of a Cancer Quack."

HOPKINS, Mark, an American scholar, born in Stockbridge, Mass., Feb. 4, 1802. He graduated at Williams college in 1824, and having filled a tutorship in the college for two years, he received in 1828 the degree of M. D., and began the practice of medicine in New York. In 1830 he was recalled to Williams college as professor of moral philosophy and rhetoric, and in 1836 he succeeded Dr. Griffin as president of the college, which post he held till 1872, when he resigned, and is now (1874) professor of mental and moral philosophy. He

received the degree of D. D. from Dartmouth college in 1837, and of LL. D. from the university of New York in 1857. In the latter year he became president of the American board of commissioners for foreign missions. He has published "Lectures on the Evidences of Christianity" (8vo, Boston, 1846; new ed., 1864); "Miscellaneous Essays and Discourses" (1847); "Lectures on Moral Science" (1862); "Baccalaureate Sermons and Occasional Discourses" (1863); "Law of Love, Love as a Law" (1869); "An Outline Study of Man" (New York, 1873); and a number of occasional sermons and addresses.

HOPKINS, Samuel, an American clergyman, born in Waterbury, Conn., Sept. 17, 1721, died in Newport, R. I., Dec. 20, 1803. Till about his 15th year he was occupied chiefly in agricultural labor, when he entered Yale college, where he graduated in 1741, after which he studied divinity with Jonathan Edwards. In 1743 he was ordained pastor of the church in Housatonic (now Great Barrington), Mass., where he remained till January, 1769, when he was dismissed, and began preaching in Newport, R. I. In April, 1770, it was voted not to invite him to settle there, as many were dissatisfied with his theological sentiments. He preached a farewell discourse, which was so touching and impressive that the vote was immediately and almost unanimously reversed, and he was settled as pastor. When the British took possession of Newport in 1776, he was obliged to leave the town, and preached in various places till 1780, when, Newport being evacuated, he returned to his parish, which was so much reduced and impoverished that for the remainder of his life he was dependent for his maintenance upon weekly contributions and the voluntary aid of a few friends. In 1799 he was attacked with paralysis, from which he never entirely recovered, though his mental powers were uninjured, and he was afterward able to preach occasionally. By sermons and his famous "dialogues," by letters to public men, and newspaper essays, he stirred up an organized and political action against slavery, so that in 1774 a law was passed forbidding the importation of negroes into the colony, and in 1784 it was declared by the legislature that all children of slaves born after the following March should be free. He also formed a plan for evangelizing Africa, and colonizing it with free negroes from America, as early as 1773. Besides his numerous sermons, addresses, and pamphlets, he published a life of President Edwards, and lives of Susannah Anthony and Mrs. Osborn, and left behind him sketches of his own life. His "System of Theology," however, is his great work, which, in connection with his other theological writings, must be fully understood by every one who would rightly appreciate New England either in its progress or its present condition. Of its author Dr. Channing writes that "he must always fill an important place in our ecclesiastical history."

The entire works of Dr. Hopkins were published by Dr. West in 1805, and again, with a memoir of his life and character by E. A. Park, D. D., by the doctrinal tract and book society (3 vols., Boston, 1852).

HOPKINS, Stephen, one of the signers of the American Declaration of Independence, born in Scituate, R. I., March 7, 1707, died in Providence, July 13, 1785. In early life he took up his residence in Providence, and in 1733 was elected a member of the general assembly, and in 1739 chief justice of the court of common pleas. In 1755 he was elected governor of the colony, and held the office, with the exception of four years, till 1768. In 1754 he was appointed a member of the board of commissioners which assembled at Albany, N. Y., to concert and digest a plan of union for the colonies. In 1765 he was elected chairman of a committee appointed at a special town meeting held in Providence to draft instructions to the general assembly on the stamp act. The resolutions reported were the same that Patrick Henry introduced into the house of burgesses of Virginia, with an additional one stating that "we are not bound to yield obedience to any law or ordinance designed to impose any internal taxation whatever upon us, other than the laws and ordinances of Rhode Island." These resolves passed in the assembly, including the above, which had been rejected in Virginia. In August, 1774, he was, with Samuel Ward, elected to represent the state in the general congress held at Philadelphia, and was also chosen in 1775 and 1776. His signature to the Declaration of Independence trembles owing to a nervous affection. He was one of the committee that drafted the articles of confederation for the government of the states. John Adams says: "The pleasantest part of my labors for the four years I spent in congress, from 1774 to 1778, was in this naval committee. Mr. Lee and Mr. Gadsden were sensible men and very cheerful, but Gov. Hopkins of Rhode Island, above 70 years of age, kept us all alive. Upon business his experience and judgment were very useful. But when the business of the evening was over, he kept us in conversation till 11, and sometimes till 12 o'clock. His custom was to drink nothing all day, until 8 in the evening, and then his beverage was Jamaica spirits and water. It gave him wit, humor, anecdotes, science, and learning. He had read Greek, Roman, and British history, and was familiar with English poetry, particularly Pope, Thomson, and Milton; and the flow of his soul made all his reading our own, and seemed to bring in recollection in all of us all we had ever read. I could neither eat nor drink in those days; the other gentlemen were very temperate. Hopkins never drank to excess, but all he drank was immediately not only converted into wit, sense, knowledge, and good humor, but inspired us with similar qualities." In 1765 he commenced a "History of the Planting and Growth of

Providence," published in the "Providence Gazette." He also published "The Rights of the Colonies Examined," reprinted in London.

HOPKINSON. I. Francis, one of the signers of the American Declaration of Independence, born in Philadelphia in 1737, died May 9, 1791. He graduated at the college of Philadelphia, having been the first student who entered that institution, and afterward studied law. In 1766 he went to England, where he remained two years, and then settled at Bordentown, N. J. In 1776 he was sent from New Jersey as one of her representatives in congress. During the revolution he distinguished himself by satirical and political writings, which attained great popularity. In 1779 he was made judge of the admiralty of Pennsylvania, which office he held for ten years, until the organization of the federal government, when it expired. As soon as Washington entered upon his duties as president of the United States, he appointed Hopkinson United States district judge for Pennsylvania. He was not only familiar with science as it then existed, but skilled in painting and music, composing popular airs for his own songs. His political writings include "The Pretty Story" (Philadelphia, 1774), "The Prophecy" (1776), and "The Political Catechism" (1777). The best known of his poems are "The Battle of the Kegs," a humorous ballad (new ed., Philadelphia, 1866), and "The New Roof, a Song for Federal Mechanics." The "Miscellaneous Essays and Occasional Writings of Francis Hopkinson" were published by Dobson (Philadelphia, 1792). **II. Joseph**, an American jurist, son of the preceding, born in Philadelphia, Nov. 12, 1770, died there, Jan. 15, 1842. He graduated at the university of Pennsylvania, studied law, and began to practise at Easton, Pa., in 1791, whence he returned to Philadelphia. In the celebrated case of Dr. Rush against William Cobbett in 1799, he was leading counsel for the plaintiff, and for the defendants in the insurgent trials before Judge Chase in 1800. Subsequently, when Judge Chase was impeached before the United States senate, he chose Mr. Hopkinson to defend him. From 1815 to 1819 he was a member of the house of representatives from Philadelphia, where he opposed the recharter of the United States bank. In 1823 he resumed the practice of his profession, and in 1828 was appointed judge of the United States court for the eastern district of Pennsylvania. He is best known as the author of the national song "Hail Columbia," written in 1798 for the benefit of an actor named Fox, after an air entitled "The President's March," composed in 1789 by a German named Feyles. He was for many years a confidential friend of Joseph Bonaparte, then residing at Bordentown, and during his absence always managed his affairs.

HOPKINSVILLE, a city and the county seat of Christian co., Kentucky, on Little river, and on the St. Louis and Southeastern railroad,

71 m. N. W. of Nashville, and 170 m. S. W. of Frankfort; pop. in 1870, 3,136, of whom 1,460 were colored. It is well built and regularly laid out, many of the streets being paved and bordered with shade trees. It contains a botanic garden, manufactories of tobacco, ploughs, carriages, &c., two banks, a handsome court house, two weekly newspapers, a monthly periodical, and eight churches, and has an extensive trade in tobacco. It is the seat of one of the state lunatic asylums, a handsome building 368 ft. long, with rooms for 300 patients. Hopkinsville was laid out in 1799, and incorporated in 1806. It was partly burned by the confederates during the civil war.

HOPPIN. I. Augustus, an American artist, born in Providence, R. I., July 13, 1828. He graduated at Brown university in 1848, and was subsequently admitted to the bar of Rhode Island; but his love of art proved too strong to admit of a legal career, and he went to Europe to study the works of the great masters. Of late years he has devoted himself exclusively to drawing upon wood. He has illustrated Butler's poem of "Nothing to Wear," "The Autocrat of the Breakfast Table," "The Potiphar Papers," "The Arabian Days' Entertainments," "Mrs. Partington," and a variety of other publications. Some of his elaborate pen and ink drawings are full of character and noted for graceful execution. **II. Thomas F.**, brother of the preceding, born in Providence in August, 1816. He studied painting with Paul Delaroche in 1837-'8, and subsequently designed the figures on the great window of Trinity church in New York. He has produced a spirited model of a dog, which has been cast in bronze, and numerous etchings in outline and designs on wood.

HOP TREE (*ptelea trifoliata*), an American shrub of the rue family (*rutaceæ*), also called shrubby trefoil. It is a tall shrub, forming if kept trimmed to a single stem a tree 30 or 40 ft. high, and is found from Pennsylvania southward and westward. The leaves are trifoliate with ovate, pointed leaflets, which are downy when young; the flowers, borne in cymes at the ends of the new shoots, are small, greenish, and inconspicuous; they are polygamous—staminate, pistillate, and perfect ones occurring on the same plant; each has three to five sepals and petals, and in the staminate and perfect ones as many stamens; ovary one with a short style; the fruit is two-celled and two-seeded, being surrounded by a broad wing and resembling very much the fruit of the elm; the name *ptelea* is the Greek for elm, applied to this plant on account of the similarity of the two in their fruit. The flowers have an unpleasant odor, as do the leaves when bruised. As an ornamental shrub the hop tree has the merit of being exceedingly neat in appearance, is not subject to the attacks of insects, and from the peculiar character of its compound leaves makes a marked contrast with other shrubs and trees; it has

the demerit of tardiness in the spring, its branches remaining bare long after all other shrubs are clothed with foliage; the large clusters of winged fruit give it an attractive appearance late in the season. The fruit is intensely and even nauseously bitter, and, though



Hop Tree (*Ptelea trifoliata*).

often used as a substitute for hops, is entirely without the aromatic principle which qualifies the bitterness of the true hop. As many vegetable bitters have the property of preventing alcoholic fermentation from passing into the acetous, no doubt the fruit of this will answer the same purpose as hops in making yeast. An infusion of the leaves and young shoots is said to possess anthelmintic properties.

HOR, in Biblical geography, a mountain near the southern boundary of eastern Palestine, upon which Aaron, the brother of Moses, died. It is now generally identified with the Jebel Nebi Harun (mountain of the Prophet Aaron), the highest and most conspicuous of the range of the sandstone mountains of Edom, on the E. side of the great valley of the Arabah. Its height is 4,800 ft. above the Mediterranean.

HORACE (QUINTUS HORATIUS FLACCUS), a Roman poet, born in Venusia, Apulia, Dec. 8, 65 B. C., died Nov. 27, 8 B. C. His father was a freedman, collector, and proprietor of a farm, and though of servile origin determined to devote his time and fortune to the education of his son. He took him to Rome, where he was educated as the son of a knight or senator. One of his teachers, the flogging Orbilius (*plagosum Orbilius*), the poet has immortalized. He studied the Greek and Latin poets, especially Homer and Livius Andronicus, and went through the usual course of rhetorical instructions. From Rome he was sent in his 18th year to Athens to continue his studies, and, though he chiefly attached himself to the philosophical tenets of the Academy, he heard also Cratippus the Peripatetic and Philodemus

the Epicurean. There, too, he read Homer again, the masterpieces of Grecian tragedy and comedy, and especially the Greek lyric poets. When Brutus arrived in Athens on his way to Macedonia after the death of Cæsar, Horace enthusiastically joined him with other Roman students, and notwithstanding his youth and inexperience was advanced to the rank of a military tribune and the command of a legion in the republican army. To his share in the battle of Philippi, the loss of his shield, and his hasty flight, he playfully alludes (*Carm.* ii. 7), intimating that he knew when he was beaten, and ascribing his escape to Mercury, the god of poets. He returned to Rome with no prospects, his paternal estate having been confiscated, but was enabled to buy a clerkship in the quæstor's office, which furnished scanty emolument. Poverty, he says, impelled him to write verses. His efforts soon won the attention of Virgil and Varius, who introduced him to Mæcenas. The latter dismissed him with few words and no promises, and took no further notice of him for nine months, after which their friendship rapidly ripened into intimacy. In the following year (37) he accompanied his patron on the journey to Brundisium which is the subject of *Satire* i. 5. He soon after received from Mæcenas the gift of his Sabine farm, which he has often described, and which secured him the means of support and enjoyment for the rest of his life. His constant intercourse with Mæcenas introduced him to the society of other distinguished men, and won the notice of Augustus himself, who was ambitious of being celebrated by the poet, but whose offers of advancement the latter seems to have declined, though he expresses in his odes the prevailing admiration for "the tutelary guardian of peace, civilization, and progress." His friendship with Mæcenas was unbroken till the death of the latter, who in his last words commended him to the emperor: *Horatii Flacci, ut mei, este memor*. Horace died a few weeks later, so suddenly that he had no time to make his will, and appointed Augustus his executor and heir. He was buried on the slope of the Esquiline hill. His poems contain many particulars as to his person, habits, tastes, and temperament. He was of short stature, with dark hair which early turned gray, and dark eyes, and in advanced life was very corpulent. He was never married. He appears to have been of a singularly contented and happy nature, adopting a practical, if not speculative, Epicureanism, a lover of choice wines and good society, but generally simple and frugal in his habits. His odes are exquisitely finished, and are marked by a faultless taste and a mastery of metre and of language, by keen observation and a joyous amenity. His satires are sketches of the life and manners of the Romans in the reign of Augustus, and present a striking contrast to the more grave and severe productions of Juvenal. His epistles, including *De Arte*

Poetica, are the most perfect of his poems, fully exhibiting his terseness and elegance of style, and abounding in wise thoughts and just sentiments on manners and society, which have made Horace the favorite companion not only of scholars but of men of the world, the most read, best remembered, and most frequently quoted of all the writers of antiquity. Among the editions of Horace are those of Lambinus (1561), Torrentius (1608), Heinsius (1612), Bentley (1711), Burmann (1713), Sanadon (1728), Döring (1803), Anthon, with English notes (New York, 1830), Orelli (Zürich, 1837), Lincoln (Boston, 1851), Ritter (Leipsic, 1855), Didot (Paris, 1855), and Wickham (London, 1873). Translations of his works have been made into nearly all European languages, but there is no good English version of his complete writings. The free metrical translations of several of the odes and satires by Dryden, Pope, Swift, and others, are excellent. A collection of translations by Ben Jonson, Cowley, Milton, Dryden, Addison, Pope, Chatterton, Byron, &c., was published by Valpy as an appendix to the translation of the works of Horace by the Rev. Philip Francis (2 vols. London, 1831). The odes have also been rendered into English lyric verse by Newman (1853), Robinson (1844-'59), Lord Ravensworth (1858), Theodore Martin (1860), Conington (1863), and Lord Lytton (1869); and into French by Count Siméon (1874). Conington published a translation of the satires and epistles in 1869. Among prose versions is one by J. Lonsdale and S. Lee (London, 1873).

HORÆ (Gr. ὥραι, Lat. *Horæ*, hours), in classical mythology, the goddesses of the order of nature. In Homer they are the ministers of Zeus, guardians of the gates of Olympus, and rulers of the clouds and weather. In Hesiod they are the daughters of Zeus and Themis (Justice), who provide not only the fruits in their season, but give to a state good laws, justice, and peace. They are usually mentioned in connection with the graces and the nymphs as attendants on the Olympian divinities, adorned with wreaths of flowers, and bringing blessings to men. Their number was indefinite; in Athens two only were worshipped, Thallo and Carpo, the Horæ of spring and of the harvest season. On works of art they appear as blooming maidens, carrying the products of the seasons. The Hora of spring, the Chloris of the Greeks and Flora of the Romans, is especially celebrated in sculptures as the attendant of Venus rising from the sea, and of Proserpine on her ascent from the lower world.

HOREB. See SINAI.

HOREHOUND (Ang. Sax. *hora*, hoary, and *hune*, honey, a name originally applied to some related honey-bearing plant), the *marrubium vulgare* (Linn.), a plant of the natural order *labiata*. It is a native of Europe, now common in the older portions of this country in waste places and by roadsides. It is a herbaceous perennial, with four-angled stems 12 or 18 in.

high, which, as well as the roughish opposite leaves, are whitish downy; it bears in July and August white flowers in crowded axillary whorls. The herb, like many others of the same order, is remarkable for its aromatic odor and tonic properties, so that it is a favorite domestic medicine, being used in the form of a decoction, in a sirup, and in candy, and especially for colds and affections of the lungs. Its bitter taste is imparted to water and to alcohol. Its prolonged use is apt to derange the stomach.



Horehound (*Marrubium vulgare*).

HORGEN, or **Horch**, a town of Switzerland, in the canton and 7 m. S. of

the city of Zürich, on the W. bank of the lake of Zürich; pop. in 1870, 5,199. It is a common starting point for those wishing to ascend the Rigi; has a beautiful church, and manufactories of silk and cotton goods and of chemicals.

HORITES, the aboriginal inhabitants of Mount Seir. It is thought that they formed part of the race to which the Zuzims, the Rephaim, and Emim belonged, and inhabited Mount Seir before the Canaanites took possession of Palestine. Their name, which is derived from Hori, the grandson of Seir (Gen. xxxvi. 22), was descriptive of their habits as cave-dwellers. Their excavated dwellings are still found in hundreds in the sandstone cliffs and mountains of Edom, and especially in Petra. They are cut in the natural rock, some of them having rude arches carved over the doorways; and some are inhabited now, as they have been apparently by generation after generation. The genealogy of the Horites is twice given in the Scriptures, which say that they were divided into seven tribes. They were among the nations smitten by the kings of the east in the time of Abraham, and were superseded, or perhaps supplanted and absorbed, by the Edomites, who adopted their habits.

HORIZON (Gr. ὁρίζων, from ὁρίζω, to bound or define), the line that apparently separates earth and sky. In astronomy, the apparent horizon is a plane tangent to the earth at the observer, and the real horizon is a plane through the centre of the earth parallel to the apparent horizon. The artificial horizon is a horizontal mirror, usually the surface of a basin of mercury. Half the angular distance between a star and its image seen in the artificial horizon is equal to the altitude of the star above the real horizon.

HORMAYR, Joseph, baron, a Tyrolean patriot and historian, born in Innsbruck, Jan. 20, 1781, died in Munich, Nov. 5, 1848. He entered the Austrian military service in 1797, served in the Tyrolean militia, and afterward became director of the archives at Vienna. One of the most strenuous opponents of Napoleon, he became the chief promoter of the insurrection in Tyrol under Hofer against the French and Bavarians. After the armistice of Znaim, July, 1809, he returned to Vienna, where he was made an imperial councillor. In 1813 he interrupted the literary labors in which he was engaged to make a new attempt to revolutionize Tyrol; but he was imprisoned by the Austrian government, which was impelled to this measure by fear of giving umbrage to Bavaria, then on the point of joining the alliance against Napoleon. He was released in 1815, and appointed imperial historiographer. He lived in retirement in Brunn from 1820 to 1828, after which he held various important offices in the Bavarian service. He published *Lebensbilder aus dem Befreiungskriege* (3 parts, 1841-4); *Geschichte der gefürsteten Grafschaft Tirol* (2 vols., 1806-8); *Allgemeine Geschichte der neuesten Zeit* (3 vols., 1817-19); and *Das Land Tirol und der Tirolerkrieg von 1809* (2 vols., 1845).

HORN, a modification of the epidermis, presenting the same structure, whether in the nails of man, the claws of the carnivora and birds, the hoofs and horns of ruminants, the spines of the porcupine and hedgehog, the plates of the armadillo, the whalebone of cetaceans, the quills of birds, or the shell of tortoises. The horns of the stag and other deciduous antlers, strictly speaking, are not horn, but true bone, belonging to the dermal or exo-skeleton, and shed by a process of absorption at the root analogous to that by which dead bone is cast off in necrosis. Horn is composed of hardened albumen, gelatine, and a small portion of phosphate of lime. Its structure is a modification of epidermic cells, harder dried, more firmly adherent, and in which the nucleus is generally invisible; the cells are arranged in regular layers, each indicating a period of growth, and are marked by perceptible striae. The above named horny tissues are generally attached at the base to the dermis, and are removed with the skin; they are constantly growing and wearing away, and are liable to various deformities from accidental circumstances; and the younger cells may contain pigment matter. Sections of horn under the microscope are very beautiful when seen by polarized light. The horn of the rhinoceros, as already stated in the article **HAIR**, in its essential character is a mere bundle of hairs; the substance erroneously called whalebone, formed by the lining membrane of the whale's mouth, has no connection with the bony skeleton, but is a horny tissue, composed of fibres whose central portion, like the medullary substance of hair, contains easily recognizable cells. In the ox,

sheep, and the hollow-horned ruminants, there is a central core of bone upon which the horns are moulded.—Horn in its many varieties is adapted to numerous useful purposes; and it is an article of trade, horns and hoofs of cattle being largely exported from South America, southern Africa, and Russia. The horns of the buffalo are brought from the East Indies. From the most remote periods horns have been applied to various uses. The Egyptians and Hebrews made of them musical instruments. The Latin name *cornu* was also the name for trumpet, and the English name retains the same application, even if the instrument be made of brass or silver. The form of the horn adapted it for a drinking utensil, and the word is still sometimes employed in a manner to suggest this application. Horn was anciently employed for bows, and sometimes for scale armor. It also served instead of glass for windows. The methods now in use for working horn are described in Holtzapffel's "Mechanical Manipulations." The bony horns of the deer, being cellular within, are used only in their natural forms, so as not to expose their internal structure. They are sawn and filed into the shapes required for handles of knives and other implements. The horns particularly adapted for being converted into useful shapes are those of the ox, antelope, goat, and sheep kinds, which by reason of their laminated structure are readily separated into layers. They contain just enough gelatine to admit of their being softened by the application of less heat than is required for melting lead. The material may then be cut open with knives or shears, flattened into plates, divided into leaves, and finally struck between dies like metal. The first step in the treatment of horn is to separate the bony core. For this purpose it is macerated several weeks in water, which causes the lining membrane to putrefy, so that the core will fall out. This is burned, to make the bone earth used for cupels in assaying. The solid tip of the horn is sawn off, and is reserved for handles for knives, umbrellas, &c., and for buttons. The remainder, either cut into short lengths or entire, is softened by immersion in boiling water, and then by heating in the flame of a fire nearly to the temperature of melted lead. The pieces, unless intended for horn cups or similar objects, are then split open with a sharp-pointed knife, and spread out flat. A solid block of iron with a conical hole, and an iron plug to fit it, are also used to open horns without endangering the scorching of them. Both being heated to the right temperature, the horn slit with a knife is inserted in the hole, and the plug driven into the horn with a mallet. In a minute it is sufficiently softened to be easily opened. The pieces, now called flats, are laid between boards, or between heated iron plates, and subjected to pressure. The amount of this for general purposes, as for combs, is moderate, for much pressure tends to make the horn split into thin laminae. But if thin plates

are to be made, such as are used for lanterns, a heavy pressure is required, and if the horn is light-colored this increases its transparency. Such plates, when separated, are scraped with a wiry-edged knife till sufficiently thin, and are then rubbed with a woollen cloth dipped in charcoal dust and water, then with rotten stone, and lastly polished with horn shavings. The horn may be dyed by boiling it in infusions of various colored ingredients. A rich red brown color is given to it by a mixture of quicklime, pearlsh, and litharge which has been boiled half an hour in water with the addition of a little pulverized dragon's blood. The compound is applied hot wherever the color is wanted, and a deeper tinge is given by renewing the application.

HORN, a musical wind instrument, originally formed, as its name denotes, from the horn of an animal. The name includes a large family of instruments, many of which have fallen into disuse. The hunting horn, a brass or copper tube gradually expanding into a bell-shaped mouth, and bent into a semicircle, was long the chief form. The instrument has been so greatly improved as to rank among the first in the orchestra. The French horn consists of a metallic tube, about ten feet in length, bent into several circular folds, and gradually widening toward the end whence the sound issues, called by the French the *pavillon*. It is blown through a cup-shaped mouthpiece, and the sounds are regulated by the motion of the player's lips, the pressure of his breath, and by inserting a hand or a pasteboard cone in the pavillon. Horns are generally used in pairs, and are blown in different manners, the first horn in the orchestra generally making use of two octaves, and the second of three. For the purpose of adapting them to different keys, shifting pieces, called crooks or shanks, are added to the lower part of the tube. Music for the horn is always written in the key of C, an octave higher than it is played. In order to procure clear and distinct sounds of all the notes, the piston was added to the horn by Stoelzel. (See CORNET-À-PISTONS.) Great improvements have been made in the instrument by Sax of Paris, whose horn, modelled after the antique, affords a far greater volume of sound than the old instrument. The basset horn and the English horn are not properly horns, the former belonging to the clarinets and the latter to the hautboys. The Russian horn is a straight brass tube of various size, expanding toward the lower end.

HORN, Cape. See CAPE HORN.

HORN, Gustaf, count, a Swedish general, born in Upland, Oct. 23, 1592, died at Skara, May 16, 1657. He studied in Rostock, Jena, and Tübingen, served for a time in Holland under Prince Maurice, was afterward employed in the Swedish diplomatic service, and became senator in 1624. Receiving a command in the army of Gustavus Adolphus, he conquered Dorpat in 1625 and Kolberg in 1630, and commanded

the left wing at the battle of Leipsic in 1631. He subsequently fought in the battles on the Lech and at Lützen (1632). After the death of Gustavus Adolphus, who called him his right arm, he joined the duke of Weimar. He was made a prisoner in the battle of Nördlingen (1634), which was fought against his advice, and remained in captivity seven years. Obtaining his freedom by exchange for three other generals, in 1642, he fought against the Danes in Scania, was made minister of war in 1652, and died as field marshal and governor of Livonia and Scania.

HORN, or **Hoorne**, **Philip II. de Montmorency-Nivelle**, count of, a Flemish statesman, born in 1522, executed at Brussels, June 5, 1568. His father was descended from the noble French family of Montmorency, and on his mother's side he was related to Lamoral Egmont, with whose fate his own was destined to be unhappily linked. His mother, becoming a widow when he was about eight years of age, was married again to John, count of Horn, one of the wealthiest nobles of the Netherlands, who, having no children of his own, left his estates to his wife's children, on the condition that they should assume his name. Philip count of Horn thus at the outset of his career became one of the most powerful of his order, and subsequently received from the emperor Charles V. and from Philip II. the appointments of governor of Geldern and Zutphen, admiral of the Flemish fleet, and councillor of state. He fought with reputation in the battles of St. Quentin and Gravelines, and in 1559 accompanied Philip II. to Spain, where during a residence of two years he is supposed to have received information of the designs of the Spanish court against the Netherlands, and to have communicated them to the prince of Orange. Returning to the Netherlands, he joined Orange and Egmont in resisting the aggressive policy of Philip, and in urging him to recall Cardinal Granvelle; and with them he retired from the state councils until the departure of the obnoxious minister. Like Egmont and William of Orange, he also declined to sign the compromise of Breda against the introduction of the Spanish inquisition into the Netherlands, in which the greater part of the lesser Flemish nobility were interested; but his accidental presence with his friends at a banquet at which the signers of the compromise first took the name of *gueux* or "beggars" (April, 1566), proved afterward a serious charge against him. After the excesses committed by the iconoclasts in the same year, he was instrumental in preventing a general massacre of Catholics at Tournay; but his permission to Protestants to worship in the clothiers' hall, within the city, subjected him to a severe reprimand from the regent Margaret, in consequence of which he offered to resign all his offices, and wrote a letter to the king complaining of the policy pursued by the regent, and protesting that he would no longer treat of affairs of business with wo-

men. His possessions had meanwhile been very considerably reduced by disbursements made in the king's service, for which he had received no recompense; and he retired to his estates, discontented and smarting under many injuries real or fancied, but still loyal to the crown and indisposed to accept the doctrine of resistance already broached by the prince of Orange. He refused at first to take the new test oath exacted by Margaret; but after the retirement of the prince to Germany he made her an offer of his services, and agreed to take the oath. This new proof of loyalty was of no avail with Philip, who had long decided upon the death of Horn; and upon the arrival of Alva in Brussels, both Egmont and Horn were enticed to that city and there arrested, Sept. 9, 1567, on a charge of treason and other high offences. (See EGDMONT.) His wife and mother made ceaseless efforts to obtain for him a fair trial, and, as in Egmont's case, appeals for royal clemency in his behalf were made to Philip by potentates in all parts of Europe. He was executed after Egmont, and met his fate with composure, although, when his sentence was first made known to him, he protested against its injustice, exclaiming that it was a poor requital for 28 years of faithful services.

HORNBEAM. I. The common name of a genus of trees (*carpinus*) having wood of a horny texture, and the general appearance of the beech, the leaves resembling those of the beech or birch. The hornbeams are included with the oaks in the order *cupulifere*. In the United States the genus is represented by *C. Americana* (Mx.), the American hornbeam, a small tree from 10 to 20 ft. high, growing along streams. Its leaves are ovate-oblong, doubly serrate, nearly smooth; the barren flowers are borne in catkins on the sides of the branches, and appear before the leaves expand; the fertile flowers come out of the same bud with the leaves. The mature catkins consists of a series of unequally three-lobed bracts, each subtending a small ovate, several-nerved nut. The American hornbeam, where it has had ample space in which to grow, is a low tree with a broad, round, crowded, leafy head, the lower branches bending nearly to the ground on every side. It is readily distinguished from other trees by its ridged trunk, which is clothed with smooth bark of a slaty or bluish color, on which account it is often called, especially in western localities, the blue beech; the ridges, which run down from the under sides of the branches, are often so strong as to give the trunk the appearance of a fluted column. It is thus a tree of some claim to beauty, and it forms an interesting object in the forest, especially in autumn, at which season there are few trees which present a greater variety of brilliant tints. Easily cultivated, it is worthy of regard in arboriculture. The close-grained, white wood is used for levers, beetles, and other purposes where great strength is required, and is frequently called

ironwood. Its geographical range is from Canada to the gulf of Mexico. The common hornbeam of Europe (*C. betulus*, Linn.) is a small rigid tree, which under favorable circumstances will reach to the height of 60 or 70 ft.; but it is very seldom allowed to become a timber tree; as it grows freely after being cut down,



European Hornbeam (*Carpinus betulus*).

it is generally grown in copses to furnish small wood; this was formerly used as a hedge plant and in forming bosquets. The tree seems to have been well known to the ancients, and was called by the Greeks *ζυγία* or yoke tree from the use made of its wood. The oriental hornbeam (*C. orientalis*, Lamarck) is only a dwarf



Hop Hornbeam (*Ostrya Virginica*).

tree or shrub, rising to the height of 12 ft., and found wild in Asia Minor and the Levant. Its leaves are much smaller, and the branches grow closer together, than those of the English hornbeam. There are a few other little known and unimportant species. II. Hop Hornbeam,

a tree of the genus *ostrea* (the ancient classical name), closely related to *carpinus* in botanical characters; in this the bracts of the fertile aments are tubular, and at maturity each becomes a closed, bladderly, oblong bag, enclosing a smooth nut; these bag-like involucres together form a sort of strobile, in size and appearance so like that of the hop as to justify the common name. The tree, which has the same geographical range as the American hornbeam, never attains a large size, and bears a strong general resemblance to the black birch in manner of growth and the shape of its leaves; it is a handsome tree when in fruit, and is worthy of the attention of those planting for ornament. The wood has the same general character as that of the hornbeam, is used for the same purposes, and like that is called ironwood. The European hop hornbeam (*O. vulgaris*), a native of southern Europe, so closely resembles our native tree that some have supposed that they may be forms of the same species.

HORNBILL (*buceros*, Linn.), a genus of conirostral birds of Africa and the East Indies, of the family *bucerotidae*. The principal genus *buceros* is characterized by an enormous bill, long, broad, curved, surmounted by helmet-like prominences of various sizes and shapes, with compressed sides and acute tip; the lateral margins are more or less jagged and serrated in the adult; the nostrils are basal, lateral, and small; the wings are rather short, with the third quills nearly as long as the fourth and fifth, which are equal and longest; tail long and broad, more or less graduated; tarsi short, robust, covered in front by large transverse scales; toes broad and long, and united at the base so as to form a kind of sole; the hind toe large and flat, giving a firm support in their leaping mode of progression; claws long, curved, and sharp. The face and throat are more or less naked, sometimes with a gular pouch; above the eyes are a few bristly hairs, like lashes; the tongue is small and cartilaginous. Nearly 40 species are described, in which the bill, always large, has a great diversity of form, varying in its protuberances according to age; bulky though it be, it is of a light and cellular structure, and by no means the formidable weapon its size would indicate; its awkward shape and slight mechanical support render it difficult for the bird to manage except for seizing objects requiring slight force; its thin edges, broken by use, undergo a constant process of repair. Most of the species are of large size; they are observed singly or in parties, in the dense jungles and woods, perched on the highest branches, especially on decayed limbs near rivers; they feed upon pulpy fruits, small quadrupeds, birds, reptiles, and insects, which they crush with the bill, and, after tossing them into the air, swallow whole; when hard pressed they will not refuse carrion. The flight is heavy and straight, generally at a considerable height, and accompanied

by a remarkable noise; the cries are hoarse croaks or harsh screams; the nest is hollowed in a decayed tree, and the eggs are about four. The largest species is the rhinoceros hornbill (*B. rhinoceros*, Linn.), nearly 4 ft. long, with an expanse of wings of about 3 ft.; the bill is



Rhinoceros Hornbill (*Buceros rhinoceros*).

nearly a foot long, the upper mandible having a recurved prominence like a rhinoceros horn, giving the head the appearance of being top-heavy; the general color is black, the tail being tipped with dirty white; the bill is black at the base, reddish in the middle, and light yellow at the point. It is a stupid and cowardly bird, seldom showing any vivacity except when in search of food; it is found in



Red-billed Hornbill (*Buceros erythrorhynchus*).

India and its archipelago, and is common in collections of natural history; it is voracious, and in captivity is decidedly omnivorous. The red-billed hornbill (*B. erythrorhynchus*, Temm.), a native of Africa, like the rest of the genus, breeds in hollow trees; it occupies

holes, according to Livingstone, in the mopane tree (*Bauhinia*), a very hard wood; the female makes her nest in February, lining it with her own feathers, and lays four or five eggs, of the size of a pigeon's, and of a white color; she remains a close prisoner in the hole until the young are fully fledged, a period of eight or ten weeks; during this time the opening is plastered up with clay by the male, with the exception of a slit three or four inches long and about half an inch wide, exactly fitting the shape of his beak, and through this he feeds the female and the young. While thus imprisoned she gets very fat, and is esteemed by the natives a dainty morsel; they often dig her out, letting alone the lean and overworked male. The female sometimes hatches out two young, and by the time these are fully fledged two others are just out of the egg; she then leaves the nest with the two oldest, and the hole is again plastered up, both parents attending to the wants of the remaining young until they too are able to come forth.

HORNBLLENDE (*amphibole* of Haüy), a mineral species placed by Dana in the augite section of the anhydrous silicates. The chemical composition of hornblende was formerly represented by the general formula $4RO \cdot 3SiO_2$, in which RO may be either calcium, magnesium, iron and sodium, or sometimes manganese and potassium; but Rammelsberg by comparing his analyses with those of others, concludes that all hornblendes are metasilicates of the general formula M_2OSiO_3 , or M_2SiO_3 . In some varieties the silica is replaced by alumina. The application of the law of isomorphism brings together under the same species many minerals that were formerly regarded as distinct; and thus actinolite, tremolite, asbestos, and others, are now properly included in this species. In common use the name is limited, as it was formerly applied, only to the dark crystalline minerals which are met with in long slender prisms, either scattered in quartz, granite, and other igneous and metamorphic rocks, or generally disseminated throughout their mass; constituting with feldspar alone greenstone and varieties of the trappean rocks, and also hornblende slate; with feldspar and quartz, the rock syenite, or if mica too be present, syenitic granite. The crystals are also aggregated together to form rocks called hornblende or amphibole rocks, the texture of which is sometimes granular. The color of the mineral is usually black or dark green, owing to the presence of much iron; its hardness is 5-6; specific gravity, 3.1-3.4. It has close affinities with augite, and on cooling after fusion it has been found to assume the form and cleavage of this mineral. It appears to have been produced under conditions of fusion and cooling which cannot be imitated in the laboratory, the crystals obtained artificially being of the augite type.

HORNE, George, an English bishop, born at Otham, Kent, Nov. 1, 1730, died in Bath, Jan.

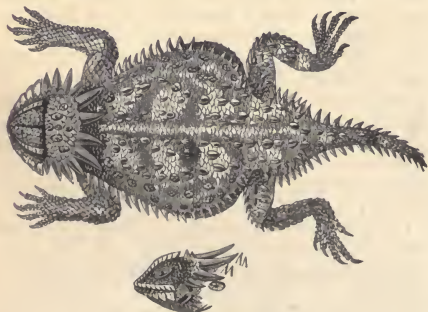
17, 1792. He took orders in 1753, and soon became distinguished as a preacher. He became president of Magdalen college, Oxford, in 1768; chaplain to the king in 1771; vice chancellor of the university of Oxford in 1776; dean of Canterbury in 1781; and bishop of Norwich in 1790. Sympathizing with the views of John Hutchinson, his first publication was an ironical attack on the philosophy of Newton in 1751, in which he draws a parallel between the heathen notions of Cicero's *Somnium Scipionis* and the Newtonian doctrines. This was followed by other similar works attacking such men as Kennicott and Shuckford. He published several volumes of sermons; "Letters to Dr. Priestley;" "Letters on Infidelity;" and a letter to Adam Smith on the life, death, and philosophy of David Hume. His chief work is his "Commentary on the Psalms" (2 vols. 4to, Oxford, 1776), on which he labored 20 years. His writings were published in 1795, in 6 vols., with a memoir of his life, &c., by his chaplain, the Rev. William Jones; and his "Aphorisms," with a biography, in 1857.

HORNE, Richard Heugist, an English author, born in London about 1803. Educated at the royal military college, Sandhurst, he entered the Mexican navy as a midshipman, and served until the conclusion of the war of independence. Returning to England, he devoted himself to literature, and wrote "Cosmo de Medicis," "The Death of Marlowe," and "The Death Fetch," tragedies founded on Elizabethan models; followed by "The Adventures of a London Doll," "The Good-Natured Bear," and "An Exposition of the False Medium, and Barriers excluding Men of Genius from the Public" (1838). Subsequently he produced a tragedy, "Gregory the Seventh" (1840), preceded by an essay on tragic influence; a "Life of Napoleon" (2 vols. 8vo, 1841); and "Orion, an Epic Poem" (1843), the price of which was announced upon the title page to be one farthing. This sarcasm upon the public appreciation of modern epic poetry attracted attention, and three large editions were sold at a farthing a copy. In the fourth edition the price was raised to a shilling, and in the fifth to a crown. This poem was followed by "A New Spirit of the Age," being criticisms upon living British authors (1844); "Spirit of Peers and People" (1846); "Ballads and Romances" (1846); "Judas Iscariot, a Miracle Play" (1848); "The Poor Artist, or Seven Eyesights and One Object" (1850); and "The Dreamer and the Worker" (1851). He also contributed largely to periodical literature. In 1852 Horne went to Australia, where, after digging in the gold mines, he became successively chief of police, gold commissioner, and territorial magistrate, and in 1859 published "Australian Facts and Principles." He returned to England in 1870.

HORNE, Thomas Hartwell, an English author, born Oct. 20, 1780, died Jan. 27, 1862. He

was educated at Christ's hospital, became a clerk in a barrister's office, and in his 19th year published his "Brief View of the Necessity and Truth of the Christian Revelation." He produced in 1818 his "Introduction to the Critical Study and Knowledge of the Holy Scriptures," and was admitted to holy orders. He also published "Introduction to the Study of Bibliography" (2 vols., 1814); an edition of the works of Hogarth (2 vols., 1821); "Manual for the Afflicted" (1832); "Protestant Memorial" (1835); "Manual of Biblical Bibliography" (1839); "Mariolatry, or Facts and Evidences demonstrating the Worship of the Virgin Mary by the Church of Rome" (1840); and "Popery the Enemy and Falsifier of Scripture" (1844). But his principal work is the "Introduction" to the Scriptures, which has been often republished.

HORNED FROG, or **Horned Toad**, an iguanian lizard of the genus *phrynosoma* (Wiegmann). In its general aspect it somewhat resembles a frog, and in its sluggishness a toad, hence the common names; but it is a true lizard, and in no respect a batrachian. The genus, which comprises about half a dozen species, all North American, is characterized by a more or less circular or oval body, flattened and covered with tuberculated scales; head short, triangular, with prominent vertex, and sharp spines or rough knobs; the temporal region much developed; neck very short and with transverse folds underneath; nostrils lateral, near the snout; tympanum visible but depressed; dentated margin on the flanks; no spinal or caudal crest; tail short and conical, with similar spiny scales; legs of nearly equal length and size, with five toes on each, moderate, the second the longest, and with sharp and curved nails; femoral pores, but no anal present. The species are found in California, Oregon, Mexico, and the S. W. states. For full descriptions



Phrynosoma cornutum.

of the species by Messrs. Baird and Girard, see Capt. Stansbury's "Expedition to Great Salt Lake," and vol. ii. of the "Mexican Boundary Survey." The best known species is the *P. cornutum*, about 4½ inches long; the general color above is a dusky gray, with black bars

and markings; below, silvery white. This species is not unfrequently carried to the north from Texas; in confinement it is sluggish and will rarely take food, but it is said to be active in pursuit of its insect prey in the wild state; it is very gentle in its disposition. It passes



Ceratophrys cornuta.

the winter in a state of lethargy in holes dug by various rodents, appearing about April and disappearing about October, at which seasons travellers are frequently annoyed by their seeking shelter from the cold night air in the folds of their blankets; their spiny covering makes them not very comfortable bedfellows.—This name has also been given to a true batrachian, a frog of the genus *ceratophrys*, in which the head is more or less roughened and spiny; it is three times as large as the common frog, with an enormous mouth. All the species live in tropical South America, and feed upon small rodents, birds, other frogs, toads, and mollusks.

HORNED POUT. See CATFISH.

HORNELLVILLE, a town and village of Steuben co., New York, at the junction of Canadecra creek with the Canistota river, and at the intersection of the Buffalo division with the main line of the Erie railway, 200 m. W. by S. of Albany, and 90 m. by rail S. E. of Buffalo; pop. of the town in 1870, 5,837; of the village, 4,552. The village contains a sash and blind factory, several car factories, a boot and shoe and a moving machine factory, tanneries, two banks, six hotels, and one tri-weekly and three weekly newspapers.

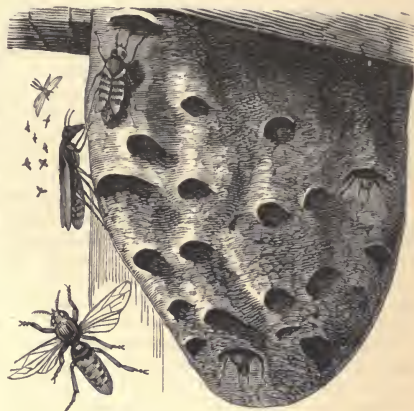
HORNEMANN, **Friedrich Konrad**, a German traveller, born in Hildesheim in October, 1772, and last heard from April 7, 1800. He studied theology at Göttingen, and became a teacher in Hanover. Under the auspices of the African society of London he went to Egypt in 1797, and after various vicissitudes reached Moorzook, when he and his companion Freudenburg were taken ill, and the latter died. Immediately after his recovery he proceeded to Tripoli, whence he forwarded the itinerary

of his journey to his friends in Europe. Returning to Moorzook, he joined a caravan for the interior, after which all traces of him were lost. König published at Weimar in 1802 Hornemann's *Tagebuch einer Reise von Cairo nach Murzuck*, an English translation appearing at the same time in London. It was translated into French by Griffet de la Baume, with additions on the geography and the oases of Africa (2 vols., Paris, 1803).

HORNER. I. Francis, a British statesman, born in Edinburgh, Aug. 12, 1778, died in Pisa, Feb. 8, 1817. He was educated at the high school and university of Edinburgh, studied for the bar, and was one of the originators of the "Edinburgh Review." In 1803 he removed to London, entered at Lincoln's Inn, was called to the bar in 1804, was one of the commissioners appointed by the East India company for settling the nabob of Arcot's debts, and in 1806 entered parliament. After the general election of 1812 he became a leader of the whig party in the house; but he disagreed with Lord Grenville on the question of war after Napoleon's return from Elba, and consequently tendered the resignation of his seat, which was not accepted. His last speech was on June 25, 1816, in favor of the Catholic claims and deprecating the harsh treatment of Ireland; soon after which he made a visit to Italy for the benefit of his health, and died abroad. A monument to him by Chantrey has been erected in Westminster abbey, and his "Memoirs and Correspondence," edited by his brother, was published at London in 1843 (2 vols. 8vo). **II. Leonard**, brother of the preceding, born in Edinburgh about 1785, died in London, March 5, 1864. In 1827 he became warden of the university of London, and in 1833 an inspector of factories. In 1848 he was elected president of the geological society. Besides many pamphlets on social questions, he published "Memoirs and Correspondence of Francis Horner" (1843), and a translation of Villari's "Life of Savonarola" (1862).

HORNET, a stinging hymenopterous insect, of the family *diploptera* and tribe of *vespiaria* or wasps, under which title their family and generic characters will be given. The European hornet (*vespa crabro*, Linn.) is about an inch long, larger than the common wasp; the thorax is black in the middle, and brown elsewhere; the abdomen is black with yellow borders, and below yellow with black spots; the upper lip yellow, and the eyes blackish; the body smooth; the wings are longitudinally folded, and the mandibles strong and dentated. The hornets, like the wasps, live in society, in nests containing males, females, and neuters, the last two of which do all the work and are armed with a venomous sting; their societies are republican, several females and their broods living and working harmoniously together. The nest is built on decayed trees, old posts, and in almost any sheltered place in barns and porticoes; it is of a rounded form, made

of coarse materials, and of the color of faded leaves; the materials of which it is composed are prepared from particles of old wood or bark by their mandibles, reduced to a kind of *papier maché* or soft pasteboard; with this, after the inside of the nest has been thickly plas-



Hornet and Nest.

tered, they make horizontal combs suspended from above by strong columns, the central being the largest; the cells are hexagonal, with the opening downward. A few females, or perhaps a single one, having escaped the rigors of winter, begin to construct a few cells and lay their eggs in the spring, the first broods being neuters, which when perfect help their mothers in the domestic economy of the nest; the larvæ are footless, each enclosed in a separate cell, where it is fed on insects and honey stolen from bees; when the larvæ have acquired their full growth, they line the cell with silk, covering the opening, and in this undergo their metamorphosis. The neuters aid in building the other nests, and in feeding the successive broods of larvæ; as the family increases, new cells and additional platforms are constructed. The young females and young males come forth about the beginning of autumn, and all larvæ which cannot become perfect before cold weather are destroyed by the neuters; the males perform no labor; both sexes meet on the trees in autumn, feeding on saccharine juices, and soon perish from the cold. There are about 150 individuals in a nest. Hornets prey upon other insects, especially flies, upon flesh, and ripe and sweet fruits; they also rob bees of their honey; a hornet's nest suspended in a place infested by flies will soon perceptibly diminish their numbers. If their nest be disturbed, they fiercely attack and sting the intruder, causing a painful and frequently dangerous wound. The wasp called hornet or "yellow jacket" in New England is the *V. maculata* (Linn.); it is too common to need any description, and its habits are those of the

family; it is often seen on trees infested with aphides or plant lice, for the sake of devouring and of carrying to its young the honey dew or sugary excretion of these insects. This species is very fierce if attacked. The nests of some of the South American species, cleared of the platforms of cells, are used as baskets, being light, strong, and very tight. Hornets, like the other wasps, make no honey. Many large wasps, varied with black and yellow, are called hornets in different parts of the country.

HORPIPE, a wind instrument, once a favorite with the Welsh peasantry, and probably still in use among them, consisting of a wooden pipe with holes at stated distances, and a horn at each end. The tone is pleasing, and somewhat resembles that of the hautboy. For this instrument was composed the lively dance tune known as the hornpipe, a name applied also to the dance which accompanies it. Both the tune and the dance are supposed to be of English invention, and the former is generally in triple time, six crotchets in a bar.

HORROX, or **Horrocks**, **Jeremiah**, an English astronomer, born at Toxteth, near Liverpool, about 1616, died there, Jan. 3, 1641. He was matriculated as a sizar at Emmanuel college, Cambridge, July 5, 1632, but left without a degree. Devoting himself to astronomy, he found difficulty in procuring the books and instruments he desired. He was for a time misled and induced to distrust the accuracy of his own observations by their incompatibility with those of Lansberg, but was set right by the study of Tycho Brahe and of Kepler. His telescope, which he did not obtain until May, 1638, cost him only 2s. 6d., but it enabled him to make the first observation ever made of the transit of Venus over the sun's disk, Nov. 24, 1639. The transit in 1631 had been predicted by Kepler, but he had failed to point out that of 1639. The tables of Lansberg indicated the latter, but did not give the time. Horrox supplied the omission by his own calculations, and prepared to watch the phenomenon. At this time he was curate of Hoole, a small village near Preston. The transit, according to his calculation, would take place about 3 o'clock of a Sunday afternoon, but to avoid mistake he began his observations at noon the preceding day. After careful watching for more than 24 hours, except during the time of divine service, which he would not neglect even in the interest of science, he was rewarded for all his toil and anxiety. This transit was observed only by himself and his friend Crabtree, whom he apprised of the coming event the preceding month. Horrox's account of it, entitled *Venus in Sole visa*, was printed by Hevelius at the end of his *Mercurius in Sole visus* (Dantzic, 1662). He remained at Hoole only about six months after this great achievement. The last three months of his life were devoted to a study of the irregularities of the tides, from which he hoped to obtain a demonstration of the rotation of the earth. He was also the author of the theory

that the lunar motions might be represented by supposing an elliptic orbit, if the eccentricity of the ellipse were made to vary, and an oscillatory motion given to the line of apsides. Newton afterward verified his suppositions, and showed that they were consequences of the law of gravitation, but he attributed to Halley what properly belonged to Horrox. The remaining works of Horrox were published by Wallis in 1672, with an exposition of his lunar theory by Flamsteed. A translation of the *Venus in Sole visa* is appended to the "Memoirs of the Life and Labors of the Rev. Jeremiah Horrox," by Whetton (London, 1859; 2d ed., 1869).

HORRY, an E. county of South Carolina, bordering on the Atlantic and North Carolina, bounded W. by the Little Pedee, which flows into the Great Pedee on the S. W. border of the county, and drained by the Waccamaw river; area, 1,200 sq. m.; pop. in 1870, 10,721, of whom 3,235 were colored. It has a low marshy surface, and is partly covered with large forests of pine. The soil is generally poor. The Wilmington, Columbia, and Augusta railroad touches the N. corner. The chief productions in 1870 were 62,039 bushels of Indian corn, 72,232 of sweet potatoes, 74 bales of cotton, and 417,507 lbs of rice. There were 451 horses, 3,347 milch cows, 6,431 other cattle, 7,592 sheep, and 17,399 swine; 3 saw mills, and 8 manufactories of tar and turpentine. Capital, Conwayborough.

HORSA. See HENGIST.

HORSCHOLT, **Theodor**, a German painter, born in Munich, March 16, 1829, died there, April 3, 1871. He travelled in 1853 in Spain and Algeria, and was from 1858 to 1863 in the Caucasus with the Russian army. He was especially distinguished for his pictures of battles and of life in the Caucasus.

HORSE, a simple-hoofed, non-ruminating quadruped, constituting the soliped family of Cuvier's order of *pachydermata*, and, in Prof. Owen's system, the family *solidungula*, of the order *perissodactyla* (odd-toed), of the group *ungulata* (hoofed), and of the mammalian subclass *gyrencephala* (wave-brained). Zoologically considered, the family consists of the single genus *equus* (Linn.), distinguished from all other quadrupeds by having only one apparent toe and a single solid hoof on each foot, although under the skin, on the sides of the metacarpal and metatarsal bones, are the rudiments of two others on each limb. The dentition is: six sharp and cutting incisors in each jaw; six molars on each side of each jaw, with crowns of a quadrangular form, and having the surface intersected by deep plates of enamel arranged in four crescentic masses, and with a small additional disk of enamel on the inner border of the upper teeth; there are also, in the males, two small upper canines, and sometimes lower ones, usually absent in the females; there is a considerable space between the canines and the molars, opposite the commissure

of the lips, which man has availed himself of to introduce the bit, by which this animal is subjugated to his uses; in the young animal there are also deciduous molars. The different species of *equus*, as the zebras and the asses, so resemble each other in outward form and internal economy that the description of the typical species, the horse, will answer for all, with the exception of a few structural peculiarities; they are so nearly related to each other that they will breed together, producing more or less fertile hybrids, as in the cases of the horse and ass, and both with the zebra, &c. The skull of the horse is remarkable for the great width between the orbits, its flatness, the length of the face compared with the cranium, and the vertical depth of the lower jaw; the intermaxillaries project considerably beyond the nasal bones, the latter overhanging the cavity of the nostrils; the temporal arch is short, straight, and situated in the posterior third of the skull. The cervical vertebræ are of large size, and the posterior are oblong with short processes, so as to secure great freedom of motion in the neck; the dorsals are 18, with short transverse processes, and very long spinous anteriorly to afford origins for the ligament which supports the head; the lumbar are six (but five in the ass), broad and firmly joined together, with remarkably well developed processes, especially the transverse; the sacrum is a single bone, made up of five consolidated vertebræ, in a continuous line with the rest of the spine, and united to the last lumbar by the very large articulating oblique processes of the latter, securing a springiness in this region in leaping and galloping; the caudals vary from 17 to 21, having the form of vertebræ only in the upper ones. The chest is capacious, compressed laterally in front, and prolonged in advance of the first rib so as somewhat to resemble the thorax of a bird; in the middle and posterior portions it is rounded, and extends far back toward the pelvis; the ribs are 18 pairs, the anterior broad and massive (8 being true), and the posterior more slender. The clavicles are absent, and the coracoid process very rudimentary; the shoulder blades are triangular, with a prominent spine, closely approximated to the chest, transmitting the weight of this half of the body perpendicularly to the ground; the arm bone is short and strong; the forearm consists almost entirely of the greatly developed radius, the ulna being a mere appendage consolidated in the adult animal to its posterior surface, though its olecranon process is of large size, affording a powerful purchase to the extensor muscles; there are no movements of pronation and supination, but only of hinge-like flexion and extension. The carpus or wrist has seven bones in two rows, four in the upper and three in the lower; the metacarpus consists of a single long bone, the shank or cannon bone, and of two smaller supplementary pieces; this long bone represents the middle-finger metacarpal of the

human hand, and the others the ring and forefinger metacarpals, those of the thumb and little finger being absent. The fore foot is made up of three bones representing the three phalanges of a middle finger, called respectively the great and little pastern and coffin bones, the latter large and crescentic, supporting the hoof; there are also three sesamoid bones implanted in the flexor tendon of the foot. The pelvis is remarkable for the elongation of the ilium and the outward extension of the crest and spine; the thigh bone is massive, and so short that it is entirely concealed under the integuments of the trunk, what is commonly called the thigh being in reality the leg; the leg is formed almost entirely by the tibia, which is very strong at its upper portion, the fibula being a long slender bone among the muscles lost about the lower third of the tibia; the tarsus consists of six bones, the astragalus or cockal bone, the os calcis or heel bone, the cuboid, the navicular, and the middle and lesser cuneiform bones, the internal or great cuneiform being absent with the great toe which it supports; the metatarsus and the hind foot are constituted as in the anterior limb, and the bones have received the same names. The muscular system of the horse is very different from that of man, and has been described minutely in treatises on veterinary medicine. The *panniculus carnosus*, of which the *platysma myoides* of man is a rudiment, is greatly developed and very movable, affording support and protection to various organs. The spinal muscles are of great extent and strength, especially in the neck and tail, which admit of much precision and grace of motion; the extensors of the forearm, the *gluteus medius* (the kicking muscle), and the muscles of the loins, extremities, and neck are generally very powerful; the muscles of the face, particularly those of the lips and nostrils, are largely developed, giving the well known variety of facial expression in this animal. The molar teeth of the horse may be known from those of other herbivora by the arrangement of the patches of enamel above referred to, and by their great length before they divide into fangs. The incisors are close together in a circle at the end of the jaws, slightly curved, with long simple fangs; the crowns are broad, thick, and short, of an elliptical form before they are much worn; a fold of enamel penetrates the crown like the inverted finger of a glove, which presents an island of enamel enclosing a cavity partly filled with cement and partly by the food; this is called the "mark," and is useful in determining the age of the animal, disappearing in very old horses, whose teeth get worn below the penetrating fold; according to Owen, it is usually obliterated in the middle incisors of the second set at the sixth year, and in the next and outer pairs in the seventh and eighth years respectively in the lower jaw, remaining longer in the upper, and in both its place is indicated for years by the darker color of the cement, even to the age of

16, after which the summits begin to assume a triangular form; the milk incisors are all shed before the age of five years. The salivary glands, especially the parotid, are remarkably developed; the stomach is simple and capacious; the intestinal canal is long, but short in comparison with that of the ruminants; but the colon is of enormous capacity, as also is the cæcum, apparently occupying the greater portion of the abdominal cavity; the small intestine is about 56 ft. long, with a circumference of from $2\frac{1}{2}$ to 6 in.; the cæcum is $2\frac{1}{2}$ ft. long, and 2 ft. in circumference at the widest part; the colon and rectum are 21 ft. long, the former averaging 2 ft. in circumference; the whole canal, therefore, is about 80 ft. long. The liver weighs between 4 and 5 lbs., having no gall bladder, and the spleen 12 oz.; the urinary bladder is small in comparison with the size of the animal, its circumference when moderately distended being about $1\frac{1}{2}$ ft.; the mammary nipples are two, inguinal, and have at the base a hollow cavity which permits the accumulation of a considerable quantity of milk, which is often used by man as an article of diet, especially for invalids. The hoof of the horse presents an admirable adaptation to secure solidity and elasticity in an instrument of progression; the whole exterior horny covering, to which the shoe is attached, composed of modified epidermic structure, is a hollow cone truncated above, into which the coffin bone is received; highest in front, it gradually diminishes backward, where it is suddenly turned inward, becoming mixed with the sole, supporting the under parts of the foot, and protecting the sole and the frog from too rough pressure against the ground; this internal wall, called the "bars of the foot," by its sloping direction, distributes the weight of the body toward the sides of the hoof, with whose numerous perpendicular horny laminae interdigitate similar processes from the vascular surface of the coffin bone. In the triangular space in the centre of the foot is an elastic horny mass called the frog, its base connecting the posterior curves of the hoof, the sides united with the bar, and the point extending about to the centre of the sole; on the sides are deep channels, to allow of its expansion and render the foot elastic; its actual thickness in horn is not so great as farriers seem to think, from the freedom with which they use the paring knife; in a well formed foot, the base of the frog ought to occupy one sixth of the circumference of the circle of the hoof; in the centre of the frog is a horny conical cavity of considerable depth, which protects the partially cleft foot from further rupture, adds to the elasticity, secures a firmer hold on loose soils, and passing above into the substance of the sensitive frog serves to unite firmly the two halves of the foot, which are completely divided in ruminants; this horny cone has been called the frogstay or bolt. The sensitive frog falls into the inverted arch of the horny frog,

which are thus held mutually in place and preserved from external shock. The sole is an irregular plate of horn, closing up the lower opening of the foot, of an arched form, abutting everywhere against the sides of the wall, another contrivance for securing elasticity. The foot of the horse, therefore, though solid in front, is partially cleft behind, so that the terms *solidungula* and *solipeda* cannot strictly be applied to it; indeed a solid, continuous, unyielding circle of horn would be very painful if not entirely useless as an instrument of active progression; this beautiful structure, however, is sadly interfered with in almost all methods of shoeing. Immediately under the hoof are extensive cartilages, attached to the last two bones, protecting the upper part of the structure and adding greatly to the elasticity of the foot, and permitting the movements of the coffin bone with the hoof; in old horses these cartilages may become partially ossified, and are then called ring-bones. Under the hoof is also a very sensitive and vascular layer, from which the hoof originates, analogous to the soft core of hollow horns and the matrix of nails. The eyes of the horse are large, and the sight is excellent, and capable of distinguishing objects by night; the ears are large and very movable, and the sense of hearing is very acute, as in other timid and comparatively defenceless animals; the sense of smell is also acute, as is seen in their selection of food and in the recognition of their masters; the cutaneous sense is very fine, and the tactile powers of the movable lips exquisite. The food in a state of nature is exclusively vegetable. The time of gestation is about eleven months, and the foal in the domesticated state sucks six or seven months; the sexes are separated at two years; at three they may be broken, and at four be ridden. The disposition of the horse is naturally gentle and confident, which qualities have made it the most useful of animals in all the arts of peace and war; it is bold in the defence of its young, and occasionally an animal is vicious, either naturally or from bad treatment in youth. As we have horses varying in size from the Shetland pony to the Flanders dray horse, and in proportions from the thorough-bred racer to the Canadian cob, with every variety of color, so we find great diversity in their moral qualities; some are bold, intelligent, or good-natured, and others timid, stupid, or cross, and by care or from neglect each of these qualities becomes the characteristic of a race. Their movements are many; besides the walk, trot, gallop, and amble, pace, or rack, some horses gallop with the fore legs and trot with the hind, others move each leg separately in succession, and others execute many artificial movements, the result of education. The horse is quick to perceive and has an excellent memory, two qualities which render his education easy; he is capable also of deep and lasting attachment. The neigh or voice of the horse is well known,

the females exercising it less frequently than the males. The horse rarely lives to a greater age than 30 years, and is not serviceable for speed or very hard work for more than half this period. In compact form, elegance of proportions, and grace of movement, combining speed and strength, it is surpassed by no animal. Almost every part of the horse after death is useful to man; his skin is valuable for gloves, his hair for making cloth, his bones for buttons and for grinding into fertilizers, his flesh as food for hounds if not for man, his hoofs for making glue, and his intestines for the manufacture of delicate membranous tissues. The experience of continental Europe has amply proved that horse flesh is a savory, nutritious, and wholesome article of food.—The original native country of the horse (*equus caballus*, Linn.) is not certainly known; but he was most probably first brought under the subjection of man in central Asia or in the part of northern Africa adjacent to Nubia



Shetland Pony.

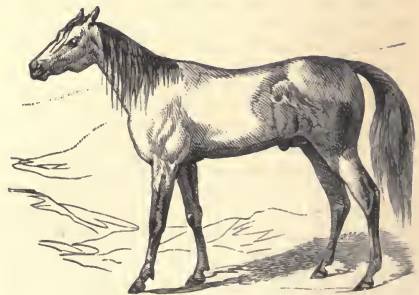
and Abyssinia. Useful as is the horse to man, the ass was preferred by nations of antiquity, from its easier management, hardier nature, and the cheaper food required to keep it in good condition; when greater wealth became common, the horse was more highly prized. Horses exist in the wild state in northern Asia and in America, the descendants of individuals formerly domesticated; in such cases they live in large troops, conducted in their wanderings and battles by an old male who has conquered the position of chief by superior strength and courage, and who, when his powers fail, is peacefully superseded by another. When danger threatens, they close their ranks, and present an unbroken circle of heels to the enemy, which is generally some of the larger carnivora. The horse, whether originating in northern Africa or in northern Asia, probably exists nowhere at the present time in its original character; but wild horses, which have lived independently for many generations, entirely exempt from the influence of

man, afford a tolerable idea of what the primeval animal was. Wild horses, as now met with, are generally smaller but more muscular than the domesticated ones, with less variety of color, stronger limbs, larger head, longer and less erect ears, more bushy mane, less sleek coats,



Mustang.

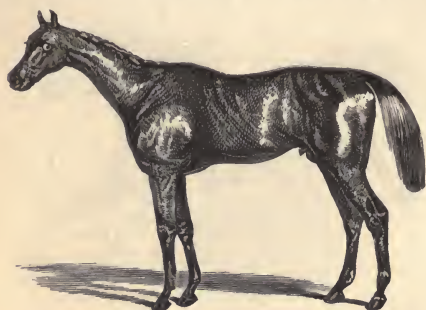
and smaller and more pointed hoofs. When these troops fall in with domesticated horses, the latter almost always rush with them in a wild stampede and are irrecoverably lost. The wild horse, or mustang, even when adult, is readily brought to the domesticated state; the American Indians are very dexterous in taking them on the prairies and the pampas by means of lassos, and much of the wealth of many tribes consists in their herds of these animals roaming without any apparent control. The wild troops have no fixed place of abode or of repose, frequenting the richest pasturages, and resting at night in dry and sheltered situations; they have great dread of storms and high winds, and a loud thunder clap will put them to flight in the utmost confusion and alarm.—Most countries have peculiar breeds of horses, adapt-



Arabian Horse.

ed to the climate and wants of the region. In Arabia we find a horse remarkable for fleetness, endurance, and docility; its blood by intermixture has been made to improve other races of all sizes and constitutions, producing the breeds most highly valued both in Europe

and America. The Tartar horses are small, but hardy, accustomed to inclemencies of weather and scarcity of food, performing long journeys with great speed. The Persian horse is descended from the Arab, but is inferior in speed and less enduring; it was brought to



English Race Horse.

England in the reign of Elizabeth, and by its cross produced an excellent breed. The Spanish breed, derived from the horse of Barbary, long enjoyed the highest reputation in Europe both for civil and military purposes; but they have now much degenerated from want of care. The Turkish horses have many characteristics of the Arab, from which they are descended. The horses of Germany and France have been modified by all the above breeds, and are very hardy; the Dutch breed are very large, and excellent for draught. The English have paid the most attention to the breeding of horses, and have surpassed all other nations in the quality of speed; the English racer is unequalled for quickness and endurance, in which respects he exceeds the best horses of the original oriental stock. America has taken advantage of the best breeds of the old world, and can compare favorably with any country; her trotting horses have no superiors in their peculiar gait. The race horse is the product of the Arabian with the native English breed, commenced by James I., improved by Charles II., who imported barbs and Turkish stallions, and crossed by the Darley and Godolphin Arabian. Crossing the thoroughbred with cold-blooded mares produces the more strong-limbed varieties used as carriage horses, roadsters, chargers, and cavalry horses. Another race is seen in the different kinds of dray horses, remarkable for strength, intelligence, and docility.—There is no doubt that the horse was unknown to the natives of America at the time of its discovery by Europeans, and it is certain also that the animal inhabited this country during the postpliocene period, contemporaneously with the mastodon and megalonyx; its fossil remains, chiefly molar teeth, have been so frequently found, especially in the southern and western states and in South America, and have been so carefully examined by competent paleontologists, that no doubt can remain of the former exist-

ence of the horse in the western world. The *E. neogæus* (Lund) and *E. major* (De Kay), two species of the closely allied genus *hipparion*, and one of *hippothierium*, indicate that the equine family were well represented in America in former geological periods; whether this ancient horse, of about the same size as the recent one, and distinguished by the usually more complex folds of the enamel of the molars, became entirely extinct before the appearance of man, may admit of question. Prof. Leidy says there is no room to doubt the former existence of the horse on the American continent, at the same time with the mastodon, and that "man probably was his companion." The fossil horse has also been found in the old world, in the pliocene of Europe with the mastodon and tapir and through all the diluvial period, and in the upper tertiary of Asia; there are two or three species described in Europe, and as many in Asia. From this it appears that the horse inhabited the old world as well as the new before the advent of man; and some of these antediluvian species may have become extinct, while others persisted in a declining condition during the early part of the human epoch. (See HIPPARION.)

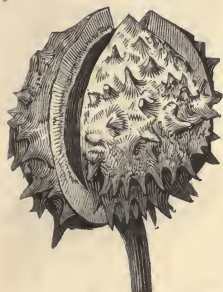
HORSE CHESTNUT (*æsculus*, Linn.), a tree of the natural order *sapindaceæ*, comprising about a dozen species, of which the most common and best known is *Æ. hippocastanum* (Linn.), a handsome tree, with broad, digitate leaves,



Common Horse Chestnut (*Æsculus hippocastanum*).

and large and showy spikes of white flowers, spotted with crimson and yellow, solely cultivated for ornamenting parks and streets, its wood being soft and of little value. The buds are remarkably large, and covered with a gummy varnish; the shoots push from them

with great rapidity in spring, and the whole growth of the tree for the year is made in very short time. This species has long been in cultivation, but its native habitat has never been ascertained. The tree has been sometimes known to grow to the height of 80 ft., though ordinarily it does not attain to more than 40.



Fruit of Common Horse Chestnut.

Its bark is astringent, and abounds in tannin; its fruit contains much starch, and has been used in fattening cattle, and given to horses afflicted with colds and coughs; from this circumstance it is said to have received its common name. It is unfit for the food of man. The nuts if not allowed to dry germinate freely, and penetrate the soil at once, by means of a strong tap root; the extremity of the root is sometimes broken off before they are set out, or sown after germination, thereby insuring the growth of more lateral roots. The fruit of the horse chestnut consists of its polished seed covered with a thick prickly husk that divides into three segments before it falls. There is a very handsome variety with deep rose-colored flowers, by some considered a species, one with double flowers, besides a form with variegated flowers, one with the leaflets deeply cut, &c.—The Ohio buckeye (*Æ. glabra*,

size of the common horse chestnut; the timber is worthless. A number of the species have the husk of the fruit without prickles; these smooth-fruited ones were formerly placed in a separate genus, *pavia*, but botanists now include them under *æsculus*. The red buckeye



Dwarf Buckeye (*Æsculus parviflora*).

(*Æ. Pavia*, Linn.) is an ornamental species, cultivated for the beauty of its flowers, which both in calyx and corolla are of a bright red; it is a small tree or large shrub, growing spontaneously from Virginia to Arkansas. The sweet buckeye (*Æ. flava*, Aiton), a large tree 60 or 70 ft. high, with pale yellow blossoms, occurs in rich woods from Virginia to Indiana and southward, where it is only a shrub 4 to 6 ft. in height. Its timber is sometimes used in building log cabins, and bowls are sometimes turned from the wood. The variety *purpurescens* (*Æ. discolor*, Pursh) is a southern form, with the leaves downy beneath and the flowers tinged with flesh color or dull purple. The dwarf horse chestnut or dwarf buckeye (*Æ. parviflora*; *Pavia macrostachya* of the catalogues) is always a shrub, and one of the finest ornaments for the lawn; it forms a dense mass much broader than high, and in July bears numerous long slender spikes of white flowers, to which the long stamens give a fine feathery appearance; it multiplies abundantly by suckers. The California buckeye or horse chestnut (*Æ. Californica*) is a low spreading tree, found along streams; the rose-tinted flowers are smaller than in the next preceding, and in a long more compact raceme; it is very ornamental. —The Spanish buckeye is a name given in Texas to *Ungnadia speciosa*, a shrub 5 to 10 ft. high, found in western Texas. The genus differs from *æsculus* in having alternate leaves and in the structure of the flower; the nut, the size of a boy's marble, is nearly black and shining; the kernel sweet and pleasant to the taste, but with decided emetic properties. It is a pleasing ornamental shrub, hardy in Georgia, but not tested much further north.



Red Buckeye (*Æsculus Pavia*).

Willd.) is a smaller tree than the preceding, but sometimes reaching the height of 50 ft., with pale yellow inelegant flowers; it grows on river banks in western Pennsylvania, Kentucky, Ohio, and Michigan; its bark exhales an unpleasant odor, and its fruit is not half the

The genus was named in honor of Baron Ungnad, who as Austrian ambassador to Constantinople first sent the seeds of the common horse chestnut to Vienna in 1815, and thus introduced that tree into western Europe.

HORSE FLY. See DIPTERA, vol. vi., p. 129.

HORSE MACKEREL. See TUNNY (American).

HORSENS, a seaport town of Denmark, in Jutland, at the head of the Horsensfjord on the Baltic sea, and the mouth of the Bygholms-Aa, 45 m. S. E. of Viborg; pop. in 1869, 10,501. It has a Latin school, manufactories of tobacco, soap, and woollen goods, and a brisk trade in corn and fish.

HORSE POWER, in machinery, a measure by which the capacity of engines is rated, established by Boulton and Watt at 33,000 lbs. raised one foot high per minute. On this basis Watt reckoned the force of his steam engines, and the term has continued in use for want of a better. It is unsatisfactory when applied to a steam engine, as it is apparent that the power of the machine varies with the pressure of steam employed. A small steam cylinder of great strength furnished with abundant boiler room may be made to do the work of a much larger engine with little boiler capacity; and it may also be objected to the use of the word, that it has no reference to the quantity of fuel the engine may consume in working up to the power named. The expression is moreover defective, inasmuch as the work of a horse does not continue in action, as may that of the engine, but is interrupted at intervals of a few hours, the length of which varies with the force exerted. Boulton and Watt allowed in their estimate eight hours as the period of work for the horse. If the measure then is regarded as anything more than a mere conventional unit and as suggesting an actual comparative estimate, the power of the engine, continuing throughout the 24 hours, should be called three times as great as the number commonly assigned to it. Computations that have been made by different engineers of the average power of horses differ greatly in their results. This is to be expected in consequence of the various modes in which their strength is applied, of the various rates of speed (the effective force rapidly decreasing with the increase of speed), and also of the different qualities of the horses. Watt based his calculations upon the work of the powerful draught horses employed at the London breweries. D'Aubuisson estimated the work done by average-sized horses in whips or hoisting machines at the mines of Freiberg, working 8 hours out of 24 in two relays of 4 hours each, amounting to 16,440 lbs. raised one foot high per minute, less than half the result of Watt's calculations; while Desaguliers made an estimate of 44,000 lbs., under similar circumstances as to the duration of work. Smeaton's estimate was 22,000 lbs., and Tredgold's 27,500. Different formulas are given for computing the horse power of engines, but they may be reduced to

the simple rule of multiplying the effective pressure upon the piston in pounds per square inch by the velocity of the piston in feet per minute, and dividing by 33,000. (See STEAM ENGINE.)—Horse power is also a name given to various machines contrived to be worked by horses. The common horse whim in use at mines is one of these. It consists of a large drum upon a vertical shaft, which is turned round by horses attached to its horizontal arms. The drum is elevated sufficiently for the horses to pass under the rope, which is wound and unwound by its revolutions. Similar machines are made of cast iron in portable forms, by which toothed wheels or belts are made to drive other machinery. Upon ferry boats the horse power has usually consisted of a revolving circular platform, upon which the horse, generally a blind one, travels, pushing this round under his feet as he draws upon the traces, which are fastened to a fixed object. For threshing machines, circular saws, &c., machines are used in which the horse works upon a narrow platform supported by endless chains, and carried round two drums; the chains are also supported upon friction rollers.

HORSE RADISH (*cochlearia Armoracia*, but by some botanists placed in *nasturtium*), a cruciferous plant having a root from an inch to 2½ in. in diameter, and a stem 2 to 3 ft. high rising from the midst of numerous large radical leaves. The stem supports smaller leaves and clusters of white flowers, which bloom in June. The pod is small, of elliptical form, but is very rarely formed in this country or in England. The plant is probably a native of southern Europe, and is cultivated in gardens for the sake of its root, which is used as a condiment, and also to some extent as a medicine. It has when freshly scraped a hot, biting taste, and a pungent odor, due to a volatile oil which is dissipated by drying. This oil is similar to, if not identical with, that of mustard. It is highly stimulating in its action, promoting digestion in the same way and under the same limitations as the other aromatics. It has besides a marked effect in increasing the secretion of the kidneys, and has been used in dropsy and in chronic rheumatism, in the latter disease both externally and internally. It is an antiscorbutic. Horse radish bears a slight resemblance to aconite, and the root of the latter has sometimes been mistakenly substituted for the former with fatal results. Horse radish is a minor crop of some importance, the root sometimes selling as high as \$200 per ton, but its price fluctuates greatly, and the average is not more than half that. It is usually grown as a second crop; the sets, which are pieces of the lateral roots, 4 to 6 in. long, are dibbled in between the rows of early cabbages, about 18 in. apart. In cultivating the cabbages no regard is had to the horse radish, but if any growth pushes from the sets it is hoed off as if it were a weed. The cabbages are taken off in June, and the ground

is left to the horse radish. An acre produces about five tons of roots, which are taken up before the ground freezes and stored in pits. The root is grated and put up in bottles with



Horse Radish (*Cochlearia* or *Nasturtium Armoracia*).

vinegar, but soon loses strength. In old gardens the horse radish often becomes a persistent weed.

HORSE SHOE, a strip of iron bent around in the form of the hoof of the horse, and fastened upon the bottom of the same by nails driven through the outer corneous layer, and clinched upon the outside. An additional security is sometimes given to it by turning up a piece of iron welded to the front part of the shoe and fitting this closely into the toe of the hoof; this serves also still more to protect the hoof from wear. For use upon icy roads, and also upon stone or wooden pavements, the shoes are provided with steel points called corks, one at each heel of the shoe and one at the toe. In the country the heel corks are usually made by turning down the iron shoe, and are not of steel, like the toe cork. Oxen also are furnished with iron shoes, each of which is made, on account of the cleft in the foot, in two parts, shaped to fit the bottom of the hoof. The need of such a protection to the feet of the horses and mules employed in war was greatly felt by the ancients, and the value of sound and strong hoofs was no less appreciated by them than by the moderns. Xenophon, Vegetius, and other authors gave certain methods of rendering the hoofs harder; but no clear intimation is anywhere to be found that either the Greeks or Romans made a practice of shoeing horses to protect their hoofs from wear. In several campaigns the cavalry were rendered useless, and the horses were sent away till their hoofs could be restored. Camels were sometimes provided with leather coverings for the feet, and the feet of oxen were protected by a bandage woven or plaited

with the fibres of plants. Beckmann is of opinion that modern horse shoes when first introduced were known by the Greek name *σέλμα*, from their moon shape; and the earliest use of this that he could discover was in the works of the emperor Leo the Philosopher of the 9th century. It is expressly stated that these are made of iron, and that nails belong to them. Horse shoeing is supposed to have been introduced into England by William the Conqueror. In the graves of some old Germans and Vandals of unknown antiquity in the northern countries, Beckmann states that horse shoes have been found with other horse furniture.—Horse shoes were always made by hand until the introduction of the machines invented by Henry Burden of Troy, N. Y. These are among the most efficient and perfect of the labor-saving machines of the day. A shoe, turned to the proper shape and grooved to receive the heads of the nails, is formed in passing through one machine. A full description would require several pages and many drawings; its general action is as follows. A bar of well worked iron is passed through rollers until it is made of the proper size. This while red hot is introduced into one side of the machine between two rollers. After it has entered a certain distance it is cut off by shears worked automatically. The piece cut off is of exactly the length required for the shoe, and it is bent in the middle over a form by the action of a tongue moved by a cam wheel. This form is placed upon a heavy revolving cylinder about 20 inches in diameter, and in its revolution carries the shoe beneath a die placed upon another cylinder, by which the shape is given to it. It is then transferred to another die formed in two other cylinders, by which the groove is cut, and places indicated by indentations for afterward punching the holes, which operation is performed by hand with a power machine. After passing through the second die the shoe is dropped upon an endless chain, which passes under the machine and also under a number of other machines placed in a row. By this means they are conveyed to an adjoining room and dumped upon a car, which carries them to different parts of a vast semicircle where the machines for punching the holes and finishing are placed. Each machine occupies a space of about 8 ft. in length by 6 in width and 7 in height, weighing several tons, and is capable of making from 50 to 60 shoes per minute.—Horse shoes have long been the subject of a singular superstition. They were thought to be a protection against evil spirits and witches, preventing these from passing the threshold at which one was nailed. Aubrey in his "Miscellanies" says that in his time (the latter half of the 17th century) most of the houses of the west end of London were thus protected.

HORSETAIL, the name of plants of the genus *equisetum* (Lat. *egurus*, a horse, and *seta*, a bristle), which belongs to the great series of

cryptogamous or flowerless plants. They have rush-like, hollow, jointed stems, with toothed sheaths at the joints, and terminated by a sort of cone of shield-shaped scales; the spore cases or parts concerned in reproduction are



Common Horsetail (*Equisetum arvense*)—Scales and Spores, and Barren and Fertile Stems.

attached to the under side of these scales; each spore has attached to it four long elastic filaments, which coil closely around it when moist, and uncoil when dry; these motions, which may be induced at will by breathing upon the spores, render them interesting objects for the microscope. The cuticle of these plants abounds so largely in siliceous matter that some are used in polishing; hence scouring rush is the common name for some species. The most common or field horsetail, *E. arvense*, is a plant of wide distribution, it being found in every continent and from the Arctic zone to Africa; this species is of interest chiefly as it is alleged to be poisonous to cattle. Like some others, it produces two sorts of stems; the fertile ones, which appear in very early spring, especially in moist places, are 4 to 10 in. high, simple, succulent, of a light brown color with black sheaths, and wither soon after the spores are discharged. The barren stems appear later, and are green and ribbed, appearing quite unlike the others; they bear numerous generally simple branches at each node, and have so much the appearance of a young seedling pine-tree that in some localities the plant is called low pine and ground pine. The plant is very generally regarded by farmers as poisonous to animals, but in this, as in other cases of plants reputed to be injurious, it is very difficult to procure positive evidence. It would seem to be quite certain that the dried plant is not poisonous, as it is often cut with the grass

when mown for hay, and we have known hay largely mixed with horsetail to be fed without injury. The sterile stem of this is also annual. There are several perennial-stemmed species, the largest of which, *E. robustum*, 3 to 6 ft. high, grows along the western rivers.

HORSFIELD, Thomas, an English traveller and naturalist, born about 1773, died in 1859. He went to Java in 1802 under the auspices of the Dutch colonial government, and remained there during its temporary occupation by the East India company. After having thoroughly studied the natural history of the island, he returned to England in 1817 with a large collection of animals and plants. The former are described in his "Zoölogical Researches in Java and the Neighboring Islands" (4to, 1821-'4); the latter in a work entitled *Plantæ Javanicæ variores* (1838-'52).

HORSLEY, John Calcott, an English painter, born in London, Jan. 29, 1817. His father was the musician William Horsley. He became known for his genre pictures, gained in 1843 a prize of £200 for his cartoon representing "St. Augustine Preaching," and subsequently executed many frescoes for the houses of parliament. Among his best known works are "L'Allegro and Il Penseroso," painted for Prince Albert, "A Scene from Don Quixote," "Under the Mistletoes," and "Caught Napping."

HORSLEY, Samuel, an English prelate and scholar, born in St. Martin's-in-the-fields, London, in 1733, died in Brighton, Oct. 4, 1806. He was educated at Cambridge, took orders in 1759, and held successively several important livings. In 1788 he was made bishop of St. Davids, in 1793 of Rochester, and in 1802 of St. Asaph. For this rapid and unusual preferment he was in part indebted to his controversy with Dr. Priestley on the divinity of Christ. He published an edition of Apollonius Pergæus (1770), and of the works of Newton (1779-'85). From 1773 he was for several years secretary of the royal society. Among his works are: "Critical Disquisitions on the 18th Chapter of Isaiah;" "Hosea, a New Translation, with Notes;" a translation of the Psalms; "Biblical Criticism;" elementary treatises on mathematics; essays on the prosodies of the Greek and Latin languages; and numerous papers in the "Philosophical Transactions." His theological works have been published in 6 vols. 8vo (London, 1846).

HORTA, a town, capital of the island of Fayal, one of the Azores, situated on the S. E. coast of the island, on a wide bay between two rocky headlands; pop. in 1864, 8,549. Its port is defended by several forts. It carries on a considerable trade in wine.

HORTENSE, Queen. See **BEAUAIRNAIS, HORTENSE EUGÉNIE**.

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